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TOWARD CLEAN CLEAR WATER

1972 CATALOG

ENVIRONMENTAL PROTECTION AGENCY

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This catalog has been prepared to demonstrate how EPA had aided in this cause in the past, and, more importantly, how EPA can help now in achieving the universal goal of a clean environment with regard to wastewater.

Information is presented on every program in EPA which is concerned with wastewater, whether it be control, treatment, monitoring, or the establishment of standards. Key individuals and organization charts for each program are included; availability of documents and/or information is indicated and sources are listed; important current projects of each program are described.

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EPA Organization

INTRODUCTION

As William D. Ruckelshaus, Administrator, U.S. Environmental Protection Agency, stated at last year's Water Pollution Control Federation annual convention: "Surely no great cause in the long history of the environment – not even the issues of slavery and poverty – has so quickly and deeply seized the public imagination as the cause of a clean environment." This catalog has been prepared to demonstrate how EPA had aided in this cause in the past, and, more importantly, how EPA can help now in achieving the universal goal of a clean environment with regard to wastewater.

Information is presented on every program in EPA which is concerned with wastewater, whether it be control, treatment, monitoring, or the establishment of standards. Key individuals and organization charts for each program are included; availability of documents and/or information is indicated and sources are listed; important current projects of each program are described.

In a very few words, this catalog tells what EPA is doing in the area of water pollution, and how EPA can help you with this problem, whether you are an individual or an organization. It is meant to be a usable document – one that will provide answers and lend direction to those involved in the water pollution control field. It by no means describes the functions of the entire U.S. EPA but is intended solely as a guide to those EPA organizations dealing with water pollution control.

The organizational structure of the U.S. Environmental Protection Agency is shown in Figure 1. Brief descriptions of the responsibilities of several key officials follow.

The *Office of Civil Rights and Urban Affairs* advises the Administrator on equal opportunity and civil rights programs and policies, minority economic development, and the impact of Agency programs on urban core areas. This Office provides the Agency's focal point for liaison with the Department of Justice, the Department of Commerce, the Civil Service Commission, the Equal Employment Opportunity Commission, and the U.S. Commission on Civil Rights and directs activities required to carry out the Agency's responsibilities to assure compliance with Executive orders to assure equal opportunity in employment in EPA, prohibit discrimination in employment on projects receiving EPA financial assistance, and prohibit discrimination in employment by EPA contractors as required by Civil Rights Acts and applicable Executive orders.

The *Office of Federal Activities* directs the development of national policy for dealing with environmental problems arising from Federal facilities and federally authorized or supported activities. The Director of the Office acts as principal advisor to the Administrator on policy recommendations concerning Federal activities to be made to the Office of Management and Budget and the Council on Environmental Quality. The Office of Federal Activities develops policies and procedures for the preparation of environmental impact statements submitted to EPA by other Federal agencies.

The *Office of International Affairs* is headed by an Associate Administrator who collaborates with Agency planning and resources management officials and program managers in the development of international programs and activities designed to further the overall mission of EPA, subject to United States foreign policy objectives established by the President and the Secretary of State. The Associate Administrator advises the Administrator and principal officials of the Agency on the progress and impact of foreign and international programs, policies, and issues, and on the impact abroad of EPA policies and programs. He serves as the focal point within the Agency for providing information relating to EPA international policies, programs, and procedures. He also serves as the Administrator's representative in contacts with the Department of State and other Government agencies concerned with international affairs. The Office develops policies, procedures, and agreements for the conduct of international activities; coordinates the conduct of all Agency international activities, and assures that adequate program, scientific, and technical inputs are provided. The Office maintains liaison, including providing representation where appropriate, either directly or through the appropriate agencies or institutions, with the United Nations, the North Atlantic Treaty Organization, and other international and multilateral organizations.

The Director, *Office of Legislation*, serves as the principal adviser to the Administrator with respect to legislative and congressional affairs and serves as the principal point of congressional contact with the Agency. He advises the Administrator and other Agency officials on all legislative proposals originating within or affecting the Agency; prepares, reviews, and obtains clearance of proposed legislation and reports on legislation; performs legislative drafting services; coordinates preparation of testimony; and reviews

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transcripts of hearings. He maintains liaison with the Congress on Agency activities and, as necessary, maintains liaison with Agency regional and field officials, other Government agencies, and public and private groups having an interest in legislative matters affecting the Agency.

The Director, *Office of Public Affairs*, serves as principal adviser to the Administrator on the public affairs aspects of EPA's activities and programs. He represents the Administrator and the Agency in relations with the press, television, radio, and other information media and provides public affairs assistance and guidance to all of the organizational elements of the Agency. The Office of Public Affairs assures that adequate and timely responses are made to public inquiries and develops and administers a cohesive information program for the Agency, including publications, audiovisual materials, and exhibits. This Office promotes the development of environmental education programs and systems; provides liaison and assistance to other agencies and groups with respect to educational programs; and prepares and distributes materials to schools, youth groups, and others on environmental matters. OPA provides the principal point of liaison with civic, service, and other groups having an interest in the mission and activities of the Agency and serves as the focal point for responding to general requests for information under the Freedom of Information Act.

The *Assistant Administrator for Planning and Management* is responsible for overall program planning activities of the Agency, including developing, initiating and monitoring new and redirected Agency programs and goals; program evaluation techniques; establishment, review, and readjustment of program priorities for Agency mission accomplishment; compiling reports to the Congress and the President on Agency programs and activities; and development, control, and monitoring of interagency agreements. This office is also responsible for budget formulation, preparation, and execution; financial management and services; fiscal controls, and systems for payroll and disbursements. The Assistant Administrator for Planning and Management also develops and conducts programs for organization and management systems, control, and services; personnel policies, procedures, and operations; management information systems, automatic data processing management and operations; contracting and procurement services; grants policies and procedures; and general administrative and support services.

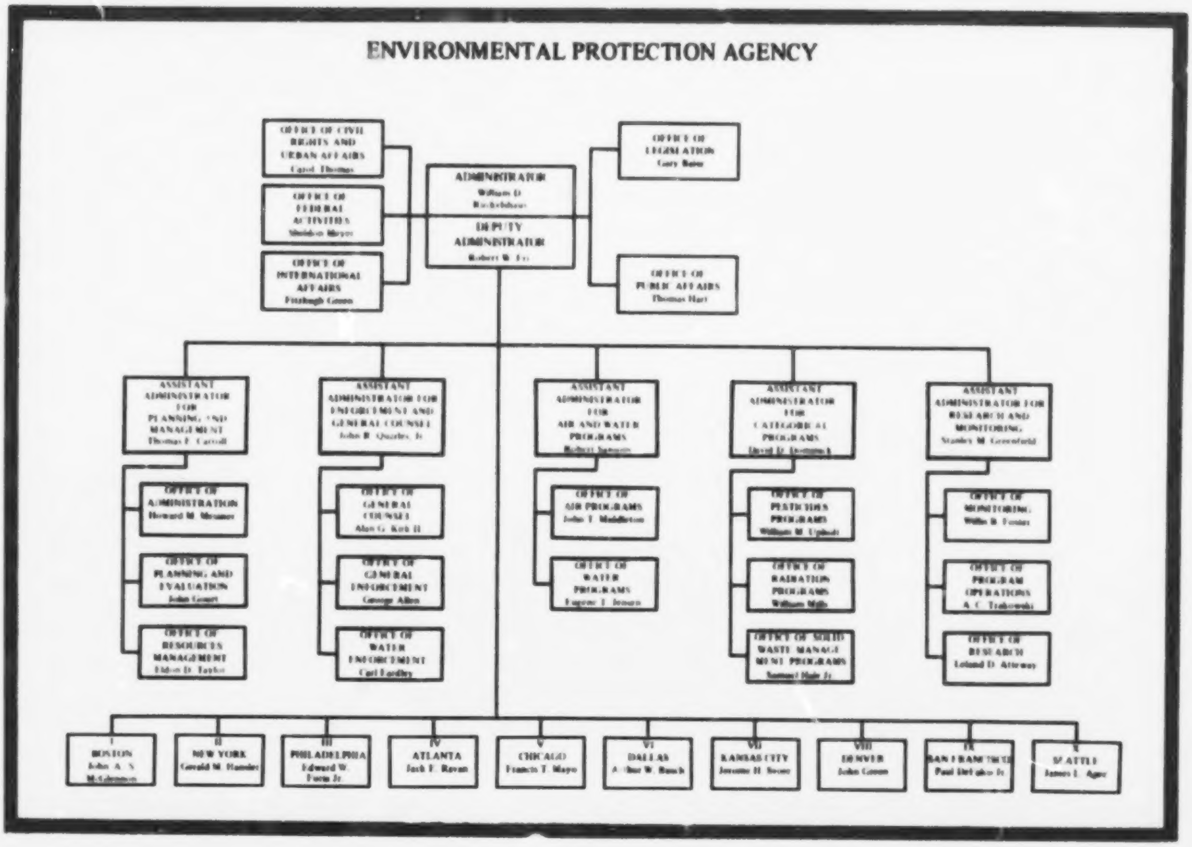
The *Assistant Administrator for Enforcement and General Counsel* serves as principal adviser to the Administrator in matters pertaining to the enforcement of standards for environmental quality, and is responsible for the conduct of enforcement activities on an Agency-wide basis. He serves as the principal legal advisor to the Administrator, and as chief law officer of the Agency.

The *Assistant Administrator for Air and Water Programs* serves as principal adviser to the Administrator in matters pertaining to air and water programs, and is responsible for the administration and operation of the air and water programs of the Agency, including program policy development and evaluation, environmental and pollution sources standards development, program policy and technical direction, support and evaluation of regional activities of the Office of the Assistant Administrator for Air and Water Programs, development of programs for technical assistance and technology transfer, and selected demonstration programs.

The *Office of Intergovernmental Programs* maintains liaison with State Governors, county executives, mayors and other local officials, and represents the Assistant Administrator in dealings with such public interest and professional groups as the National Governors' Conference, the Council of State Governments, the U.S. Conference of Mayors and the National League of Cities. This office also develops model legislation for the use of States in their air and water pollution control programs, implements technical program policy for the administration of program grants for State and interstate water pollution control agencies and provides guidance and administrative support for the Standing Advisory Committee.

The *Assistant Administrator for Categorical Programs* serves as principal advisor to the Administrator in matters pertaining to pesticides, radiation, and solid waste management activities and is responsible for the Agency's pesticides, radiation, and solid waste management programs, including program policy development and evaluation, environmental and pollution source standards development, pesticides registration, program policy and technical direction, support, and evaluation of regional activities of the Office of the Assistant Administrator for Categorical Programs, development of programs for technical assistance and technology transfer, and selected demonstration programs.

The *Assistant Administrator for Research and Monitoring* serves as the principal science advisor to the Administrator, and is responsible for the development, direction, and conduct of a national research program in pollution sources and effects, environmental sciences, and pollution control technology. He provides direct supervision to the activities of Agency laboratories engaged in research and assures the quality control and standardization of analytical techniques used by the Agency including regional technical support laboratories. The Assistant Administrator for Research and Monitoring exercises planning, coordinating, and evaluating responsibilities for all the Agency's environmental quality monitoring programs, and management responsibility for selected demonstration programs. He also provides integration of Agency wide efforts for Technology Transfer, and evaluates emerging technologies from the research, development, and demonstration program for readiness to be transferred to full-scale application.



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IV	Environmental Protection Agency Suite 300 1421 Peachtree St., N.E. Atlanta, Georgia 30309
V	Environmental Protection Agency 1 N. Wacker Drive Chicago, Ill. 60606
VI	Environmental Protection Agency 1600 Patterson Street, Suite 1100 Dallas, Texas 75201
VII	Environmental Protection Agency 1735 Baltimore Street, Room 249 Kansas City, Missouri 64108
VIII	Environmental Protection Agency 1860 Lincoln St., Suite 900 Denver, Colorado 80203
IX	Environmental Protection Agency 100 California Street San Francisco, Calif. 94111
X	Environmental Protection Agency 1200 6th Avenue Seattle, Washington 98101

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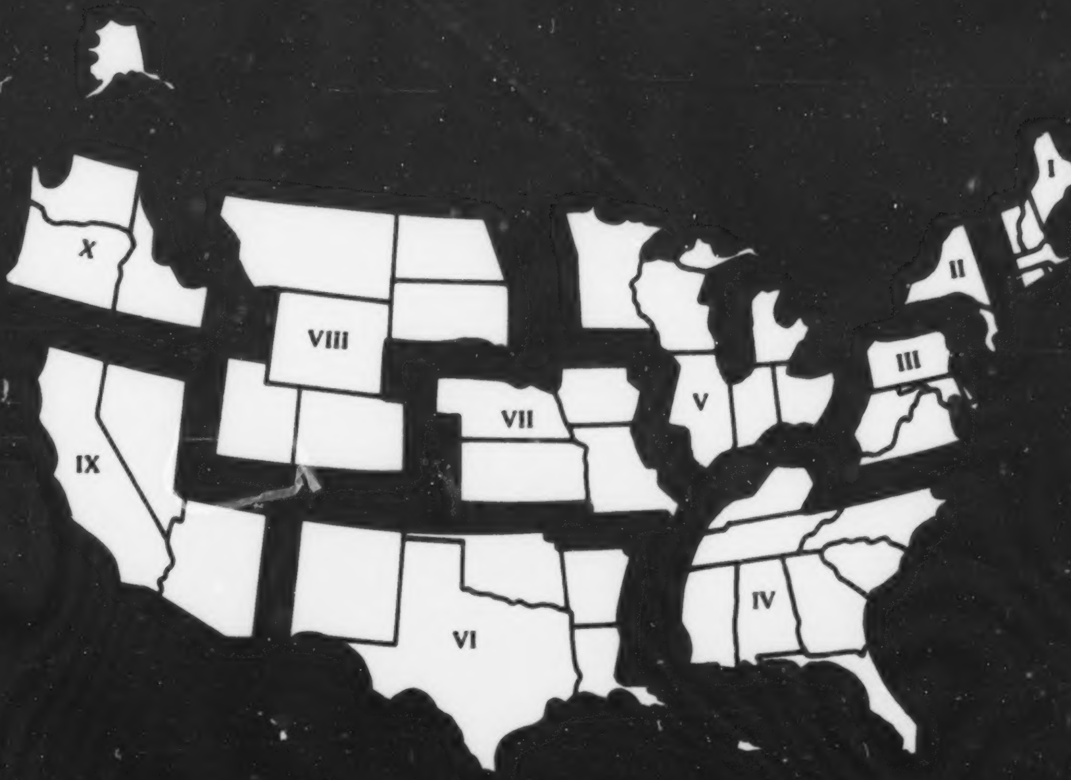
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Research & Monitoring

With the formation of the Environmental Protection Agency in December of 1970, the Office of Research and Monitoring (OR&M) was organized to conduct the Agency's research programs and monitoring activities. Figure 1 depicts the organizational structure of the Office of Research and Monitoring.

Research is conducted by the *Office of Research* primarily through a Research, Development, and Demonstration (RD&D) program which is coordinated throughout the Agency and is highly mission oriented. Each RD&D project is in response to an identified need for a solution. These needs are specified and assigned a priority primarily through input from the non-research (or operating) programs of EPA and sources outside the government, such as universities, research institutes, public interest groups, etc. In this way, the Office of Research can offer a meaningful response to the true needs of the Agency as a whole and not to those needs considered important solely to researchers.

The EPA RD&D program encompasses three distinct phases:

1. Exploratory *research* of new and imaginative pollution control methods;

2. Engineering *development* of these methods to solve the practical problems associated with bringing an "idea" out of the laboratory and into small-scale practical use.

3. *Demonstration* of this new technology to show decision-makers that the new technology has arrived and is available for widespread-full-scale application.

Notable in the RD&D program are the special authorities to support both pilot-scale and full-scale demonstration projects on advanced waste treatment and wastewater renovation, industrial pollution control, and storm and combined sewer discharges. These projects are particularly significant in that they permit EPA to carry research and development findings on into the demonstration phase, thereby literally showing what can be accomplished through the use of new technology and at what cost.

In the water pollution control research program there are two major categories of "answers" being sought. First, there is the definition of water quality goals and/or effluent standards to be attained. Second, finding ways to achieve these goals at least cost. With regard to water quality goals, research is required to determine the effects of pollution. In essence, what is being sought is the degree of effect related to the amount of water pollution and the means to predict the level and type of effect in advance. Simply knowing the level of water quality required is not enough. There is still the need to develop new and improved means for the control of pollution in order to reduce the cost of pollution abatement to the very minimum possible. In addition, there is the need to develop and demonstrate means for controlling that water pollution from sources which today is literally uncontrollable or untreatable at any cost. Finally, there is the need to develop and demonstrate means for reusing wastewater so that our relatively dwindling fresh water supply can be extended in the years to come.

The mechanisms utilized to conduct the EPA water pollution control research program are threefold:

1. *In-house research* and development conducted at seven laboratory locations plus a number of associated field sites under the direction of EPA's National Environmental Research Centers (NERC's). EPA in-house activity forms the real foundation for an effective overall RD&D program. In-house researchers establish the objectives and plans of attack; review and evaluate project proposals received by the Agency; and integrate the results of research efforts into a usable and applicable form.

In August 1971, the Office of Research and Monitoring designated three National Environmental Research Centers. They are:

National Environmental Research Center
Cincinnati, Ohio 45268

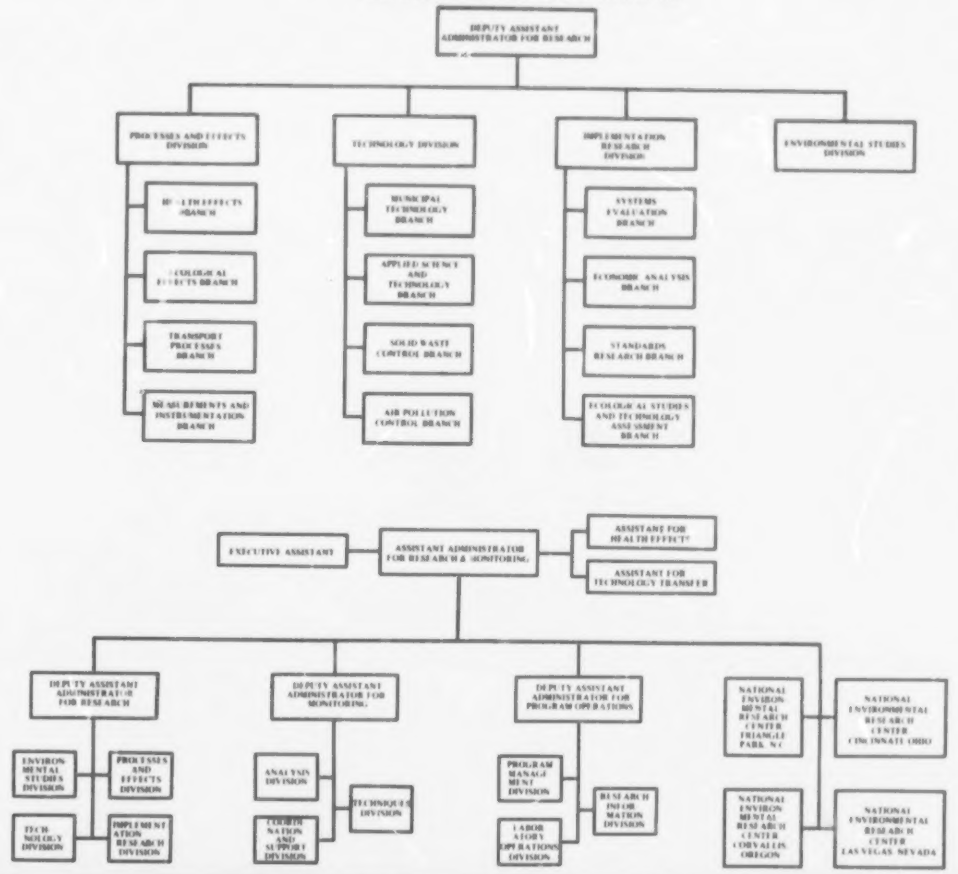
National Environmental Research Center
Corvallis, Oregon 97330

National Environmental Research Center
Research Triangle Park, N.C. 27711

The concept of National Environmental Research Centers is to fully integrate the technological expertise of laboratories which were formally focusing only on a particular aspect of environmental pollution. Each of the three NERC's has been given a broad charter of integrated environmental research and has been provided in-house capability to carry out this charter with some 30 satellite laboratories. Extramural activities (such as grants, contracts, and interagency agreements) substantially augment the in-house research activities.

Each of the three NERC's has a separate major theme. Cincinnati has the theme of pollution control technology research and development due to its long-standing, well-

OFFICE OF RESEARCH & MONITORING ORGANIZATION STRUCTURE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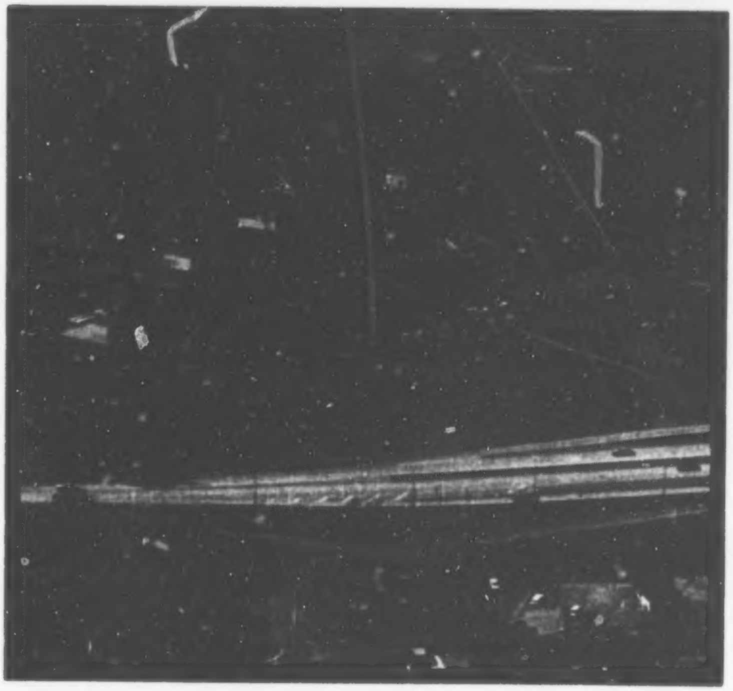


recognized expertise in the area. The Corvallis Center, known for its research in eutrophication and thermal pollution effects, has the theme of research on the ecological effects of pollution. Health effects research is the theme of Research Triangle Park, where most of EPA's toxicological and epidemiological work is done. These themes, however, are not exclusive to any one NERC, and each NERC is encouraged to develop broad interdisciplinary capabilities to enable a total-environment approach to its studies.

The *Cincinnati National Environmental Research Center* is presently active in several major research efforts aimed at solving problems associated with water pollution. These efforts are carried out by certain major divisional segments within the NERC. These efforts and segments are described below. NERC-Cincinnati also operates satellite laboratories located at Edison, New Jersey; Narragansett, Rhode Island; Dauphin Island, Alabama; and Gig Harbor, Washington.

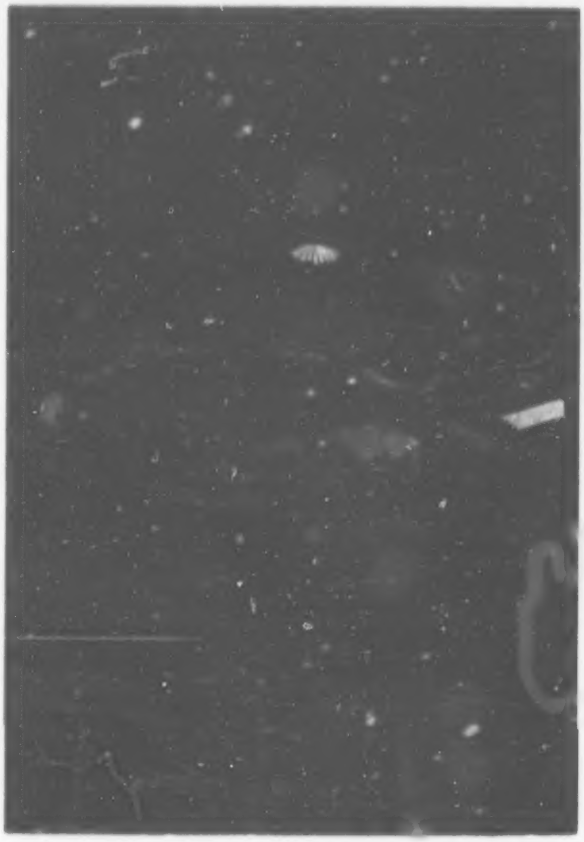
a. *Advanced Waste Treatment Research Laboratory (AWTRL).* The AWTRL conducts a national research, development, and demonstration program directed toward upgrading wastewater treatment technology required by municipalities and others for removal of the maximum possible amounts of all types of pollutants. AWTRL operates pilot plants for the investigation of various advanced waste treatment systems at Cincinnati and nearby Lebanon, Ohio; Blue Plains, Washington, D. C.; and Pomona, California. Selected processes under evaluation include chemical clarification, filtration, carbon adsorption, and reverse osmosis. Many of the processes and techniques being evaluated have immediate application for pollution abatement and some of these may lead eventually to the widespread reuse of water.

Projects include those directed at: (1) the identification of pollutants; (2) the economically feasible removal of dissolved biodegradable and refractory organics, dissolved inorganics, dissolved nutrients, suspended and colloidal solids, and micro-organisms including viruses; (3) development, optimization, and improved control of processes for the treatment of sewered wastes; (4) ultimate disposal of the removed materials; (5) wastewater renovation and reuse; (6) joint municipal/industrial wastes; and (7) selected industrial wastes.

b. *Analytical Quality Control Laboratory (AQCL).* The AQCL fulfills its role by conducting a program to assure the validity and reliability of physical, chemical, microbiological, and biological water quality data collected by the EPA. The Laboratory conducts analytical methods research, provides leadership in the selection of laboratory and field procedures, develops and evaluates automatic water quality monitoring instrumentation, conducts a reference sample program for methods and performance evaluation, and advises other EPA laboratories in the development of internal quality control programs. Specific projects include: (1) methods development for the measurement of PCB's (polychlorinated biphenyls), mercury, cyanide, and organo-pesticides in water; (2) search for new methods of identifying various aquatic organisms; and (3) evaluation of methods for analyses of trace metals in water and in wastes.

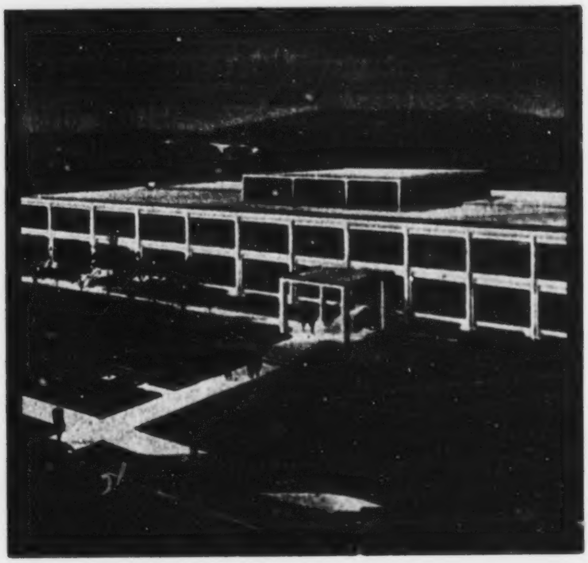
c. *Mine Drainage Pollution Control Research (MDPCR).* The MDPCR program performs research on a national scale to control water pollution from mining operations. It develops and coordinates research, development, and demonstration activities aimed at solving the acid mine drainage problems of the Nation. The program operates a field site, which engages in the provision of "trouble-shooting" problem solution. The field site, which has been located in Norton, West Virginia, is being moved to a more desirable site in Morgantown, West Virginia. Projects include: (1) demonstration of techniques aimed at preventing the formation of mine acid; (2) demonstrations aimed at neutralizing mine acid effluents; and (3) R&D aimed at removal/recovery of constituents from mine acid.

d. *Edison Water Quality Research Laboratory (EWQRL).* The Edison (New Jersey) Laboratory is one of four laboratories which are "satellite" to NERC-Cincinnati. The EWQRL program consists of the development and demonstration of novel and advanced techniques which can provide significant technical and operational impact on such water pollution problems as: oil and hazardous material spills; storm and combined sewer overflows; industrial waste effluents (e.g. from the metal finishing/electroplating industries); watercraft wastes; and wastes existent at recreational sites. Included in Edison's projects are: (1) the development of mass transfer media for the sorption of oil and hazardous materials spilled into waterways; (2) the demon-



stration of the complete conversion of waste crankcase oil into useful products; (3) the demonstration of solids removal from storm overflows by the utilization of rotating fine screens; (4) the treatment of cyanide rinse waters by electrodialysis; (5) the development of catalytic waste treatment systems for ore-carrying vessels; and (6) the demonstration of a non-aqueous sewage disposal system for remote recreational areas.

In order to provide sound scientific bases for control of environmental pollutants which adversely affect human health and welfare, the *National Environmental Research Center at Research Triangle Park* conducts comprehensive research programs on the long and short term effects of environmental pollutants; development of sampling and measurement methods and instrumentation; environmental formation and decay of pollutants; environmental meteorology; and control technology research, development and demonstration relating to stationary sources of air pollutants. In addition to the research programs, the center maintains and operates a national environmental surveillance program and a national environmental data information service; provides laboratory and other technical services to organizations external to the Center; develops environmental quality criteria and state-of-the-art documents; and operates the EPA fuel and fuel additives registration program. The Center accomplishes its mission through in-house activities located at the Research Triangle Park facilities, research facilities at the University of North Carolina, and several assigned satellite research laboratories, through research and development contracts with public and private organizations, research grants, international programs, and interagency agreements. The mission of the National Environmental Research Center at Research Triangle Park is broad in terms of media, categories, and disciplines. The on-site research and monitoring activities at Research Triangle Park concentrate mainly on air pollution problems and provide the research and monitoring backup to support the regulatory mission of EPA in air pollution. Satellite laboratories of NERC-RTP are located at Perrine, Florida; Wenatchee, Washington; Chamblee, Georgia; and Montgomery, Alabama.



The *National Environmental Research Center at Corvallis* conducts EPA's National Waste Treatment Research Program. The Waste Treatment Research Program conducts studies in food processing wastes, pulp and paper wastes, wood products, and forestry and logging. Most of the research activities of this program are concerned with the review, approval, and monitoring of research and demonstration grant projects undertaken by universities and industries. Effort is also expended in in-house studies in the pulp and paper and food waste areas. Along with direct involvement in research studies and the monitoring of projects conducted by others, NERC-Corvallis collects and disseminates information on research concerned with the treatment of these wastes. This is accomplished, in part, through issuance of reports on all completed projects. Other active research programs conducted out of NERC-Corvallis are the National Coastal Pollution Research Program; the National Thermal Pollution Research Program; The National Eutrophication Research Program; and the National Eutrophication Lake Survey Program. NERC-Corvallis also operates satellite laboratories located at Ada, Oklahoma; Athens, Georgia; College, Alaska; Duluth, Minnesota; Grosse Ile, Michigan; Gulf Breeze, Florida; and West Kingston, Rhode Island.

2. *Contract projects* primarily with industries. Contract projects are utilized mainly for laboratory investigations and pilot-scale research projects which involve a high degree of uncertainty and which are aimed at the determination of feasibility and development of design requirements. These are generally not the types of projects that municipalities and private corporations will readily sponsor due to the relatively high degree of risk involved. The work performed under contracts often requires specialized personnel, and equipment and facilities having a high value over a short period of time, but limited long-term value.

3. *Grant projects* with universities, industries, states, municipalities, and individuals. Grant projects are employed in meeting objectives where it is desirable to utilize state, municipal, academic, or industrial talents and expertise in carrying out research, development, and (often) demonstration efforts resulting in a mutual benefit to both the Federal Government and the grantee.

Each research program has a Program Element Manager (PEM) in Washington who is responsible for formulation of broad objectives. Implementation of these objectives rests with a Program Element Director (PED) located in the National Environmental Research Centers.

PROGRAM ELEMENT MANAGERS FOR MUNICIPAL RESEARCH

William A. Rosenkranz, Chief, Municipal Technology Branch, is the Program Element Manager for all municipal pollution control research, development, and demonstration projects. Because of the wide diversification of the municipal technology research program, three section chiefs function as assistants and are responsible for the following areas:

Mr. Lawrence C. Gray
Municipal Sewered Discharges
Combined Sewer-Overflows & Storm Water Discharges
Non-Sewered Domestic Wastes
Mr. James V. Basilico
Treatment Process Development
Mr. Darwin A. Wright
Treatment Process Optimization
Water Quality Control
Cold Climate Waste Treatment

PROGRAM ELEMENT MANAGERS FOR INDUSTRIAL RESEARCH

William J. Lacy, Chief, Applied Science and Technology Branch, is the Program Element Manager for all industrial pollution control research, development, and demonstration projects. Because of the diversity of these projects, four section chiefs function as assistants in the following program elements.

Mr. Harold Bernard
Oil and Hazardous Materials
Agricultural Sources
Transportation Sources
Mr. Ernst P. Hall
Hydrological Modifications
Mining Sources
Mr. George Rey
Heavy Industrial Sources
Mr. George R. Webster
Food, Paper and Other Industrial Sources

MUNICIPAL TECHNOLOGY RESEARCH PROGRAM

The Municipal Technology Research Program for water pollution control involves three major areas of study (see Figure 2). The first area of study is the development and demonstration of *municipal pollution control* technology for the effective and economic control of pollution from sewered discharges, combined (sanitary and storm) sewer discharges, storm sewer discharges, non-sewered runoff, and non-sewered domestic wastes. The number of sewered communities in the United States is just under 17,000, serving 75% of the Nation's population. Raw or inadequately treated sewage from millions of people still flows into our streams. Although many communities have been installing and improving their waste treatment facilities, over 1,000 communities outgrow their treatment systems each year and it is estimated that waste loads from municipal systems will increase nearly four times over the next 50 years.

Increasing demands for more efficient and more economical methods of collecting and treating sewered wastes face every urban community. Cost studies indicate

wastes face every urban community. Cost studies indicate

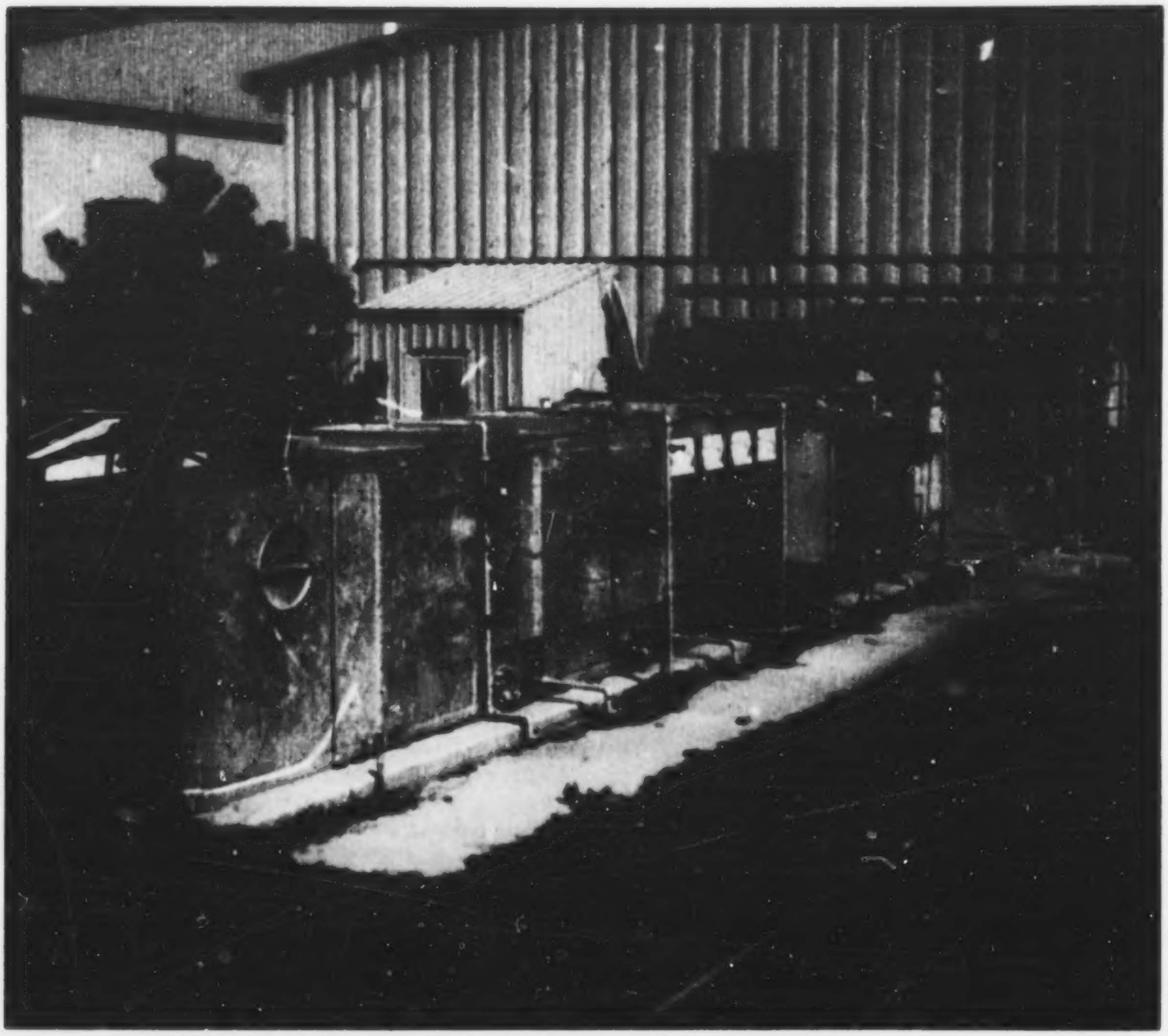
necessary over the next five years to achieve adequate levels of treatment for the Nation's municipal wastes. In addition, there are over 15,000 sewage overflow discharge points in the United States which release untreated surface runoff mixed with sewage and industrial wastes. The solution of combined sewer separation is costly (estimated at $48 billion in 1968) and of doubtful reliability in actual pollution reduction. It is now estimated that alternatives to separation being developed through our research efforts could cut remedial costs to less than half the initial estimate.

Strong emphasis in the municipal technology program is placed on developing and demonstrating new and improved treatment systems for the treatment of sewered wastes and for the control of storm and combined sewer discharges. For non-sewered wastes, development of alternative treatment systems and flow reduction devices for individual homes and isolated groups of homes or institutions is being emphasized.

Process development is the second major area of study in the municipal technology research program. This involves the investigation of specific unit treatment processes from the basic research stage, through development, to demonstration as an integral part of a treatment system. Considerable research is required to achieve future water quality standards at any necessary location, under any conditions, and at minimum cost. Past work has involved phosphorus and nitrogen removal, use of granular and powdered carbon, filtration devices, ion exchange, use of pure oxygen in activated sludge plants, and investigation of disinfection techniques. Much of the overall research effort is directed toward the development of completely new wastewater treatment processes.

Treatment and control optimization research investigates a variety of areas of municipal technology. Ultimate disposal of sludge generated at wastewater treatment plants and associated by-product recovery is of major importance. Work has been initiated on the improving instrumentation, automation, and optimization of wastewater treatment plants with the ultimate objective of eventual wastewater reuse. Specific reuse applications such as for irrigation, recreation, industrial cooling water, industrial process water, boiler feed water, ground water recharge, domestic nonpotable uses, and potable uses are being investigated. In addition, research for extremely cold climates has been instituted and other potential water pollution control techniques to supplement the municipal wastewater treatment facility, such as in-stream aeration, have been studied.

The major EPA in-house basic research efforts for municipal pollution control is conducted by the Advanced Waste Treatment Research Laboratory at Cincinnati, Ohio. Basic research studies on biological systems, physical-chemical treatment techniques, ultimate disposal methods, cost analysis, and many others are conducted at this laboratory by EPA's professional staff. In addition, EPA is currently operating and financing three pilot treatment plants to obtain practical data on new wastewater treatment



systems. These *pilot plants* are located at Washington, D. C.; Pomona, California; and Lebanon, Ohio; and are briefly described here:

ADVANCED WASTE TREATMENT FACILITY, WASHINGTON, D. C.

This pilot plant is a cooperative effort between the Environmental Protection Agency and the Washington, D. C., Department of Sanitary Engineering. The pilot plant is an adjunct to the main D. C. Water Pollution Control Plant which treats 240 million gallons per day of wastewater from the District of Columbia and its suburbs.

The pilot facility now consists of a 100,000 gallon per day physical-chemical treatment plant, a 200,000 gallon per day multipurpose plant, and a 100,000 gallon per day oxygen-activated sludge plant. The original pilot plant was designed and constructed by EPA for tertiary treatment of wastewater after conventional treatment by the main plant and has been in operation since September of 1967. The multipurpose pilot plant, designed by EPA, was constructed in 1969 by the District of Columbia, with a Federal grant. The design of the treatment systems in the multipurpose plant permits their use for physical-chemical treatment of raw wastewater as well as for primary and secondary treatment. The oxygen-activated sludge system was completed in May of 1970 and will verify results from other locations indicating that the use of oxygen permits a considerable reduction in aeration time and cost.

Two additional pilot systems have recently been constructed: a solids handling pilot plant and an ozone pilot plant. The solids handling pilot plant was constructed, and is operated by, the District of Columbia with support from a Federal grant. It is used to investigate and optimize solids disposal and chemical recovery processes for both conventional and physical-chemical treatment systems.

The ozone pilot plant was designed and constructed and will be operated by Air Reduction Company through an EPA contract. This 50,000 gallon per day plant will be used to evaluate ozone oxidation of the "residual" organics in various wastewaters and for disinfection.

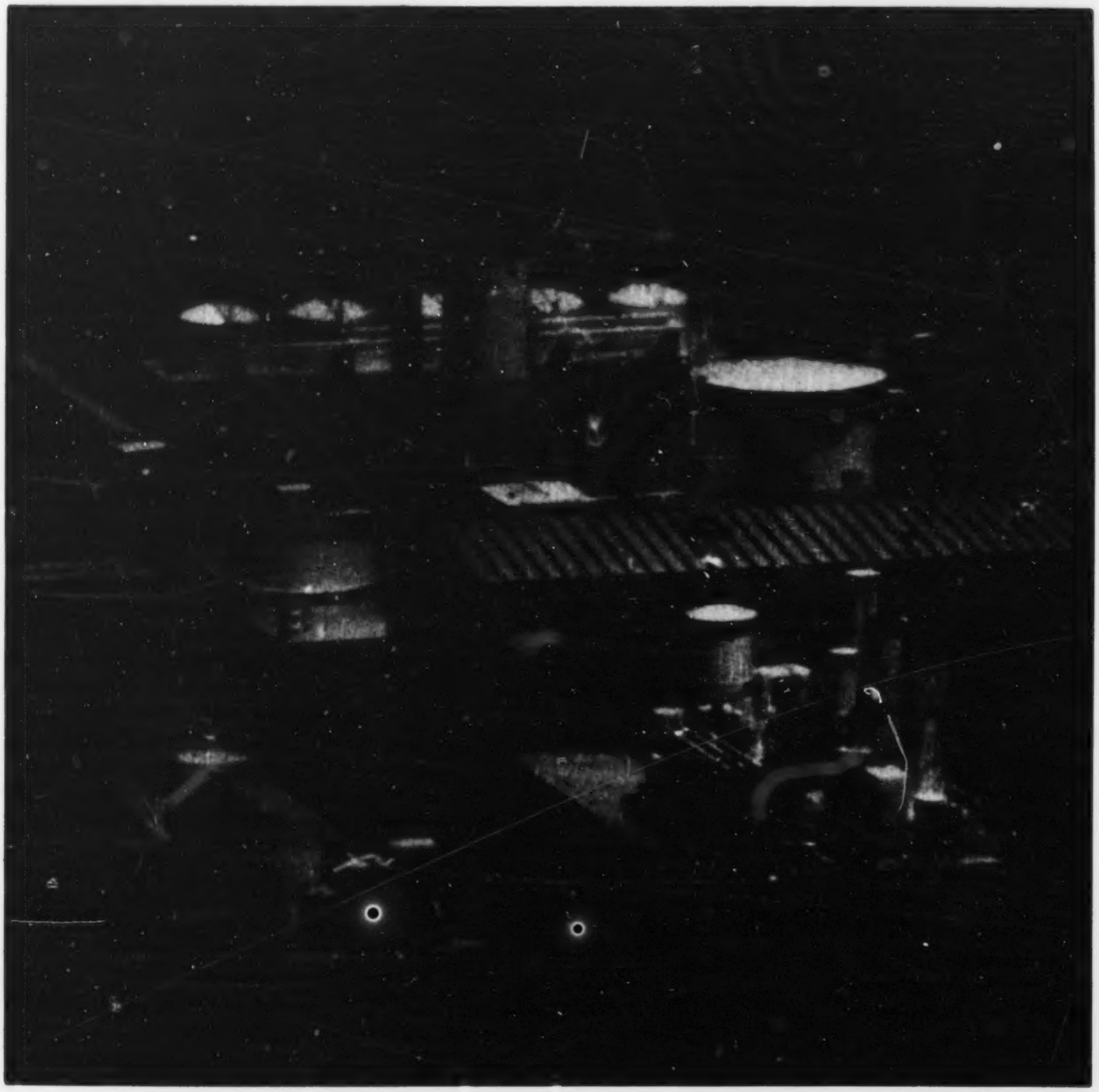
The operation of all five pilot plants will permit systems analyses and optimization of various combinations of processes to produce any quality of effluent.

ADVANCED WASTE TREATMENT FACILITY, POMONA, CALIFORNIA

In 1963, the Environmental Protection Agency and the County Sanitation Districts of Los Angeles County agreed to cooperate in the funding and staffing of pilot plant facilities on the grounds of the Pomona Water Renovation Plant. The pilot plant receives a portion of the effluent from the conventional biological facilities and investigates processes and combinations of processes to improve the quality of the water. The Sanitation Districts are particularly interested in treatment processes which will produce reusable water.

The Pomona Water Renovation Plant provides conventional primary sedimentation and activated sludge treatment to approximately 10 million gallons per day of wastewater originating in the City of Pomona and surrounding communities. The final effluent from this well-run plant contains 10 milligrams per liter (mg/l) of suspended solids, 5 mg/l of biochemical oxygen demanding materials (BOD), 45 mg/l of chemical oxygen demanding materials (COD), and 600-700 mg/l of dissolved salts.

The initial effort at the Pomona Advanced Waste Treatment Pilot Plant was directed toward developing technical and economic information on the granular activated carbon adsorption process for removing the dissolved organic contaminants (as measured by COD) remaining in the conventionally-treated wastewaters. This project has progressed to the point where relatively firm economic estimates can be made. Work on various modifications of the carbon adsorption process is continuing and the investigation of several other processes has been undertaken. In addition to carbon adsorption, the Pomona staff is working on ion exchange, electrodialysis, reverse osmosis, mineral addition to conventional processes to enhance phosphorus removal and biological denitrification.



ADVANCED WASTE TREATMENT FACILITY, LEBANON, OHIO

On October 23, 1964, the Environmental Protection Agency and the City of Lebanon, Ohio, entered into a cooperative agreement to permit the construction and operation of an advanced waste treatment pilot facility at the site of the municipal wastewater treatment plant. The pilot plant would receive effluent from the municipal plant and investigate processes designed to further increase its quality.

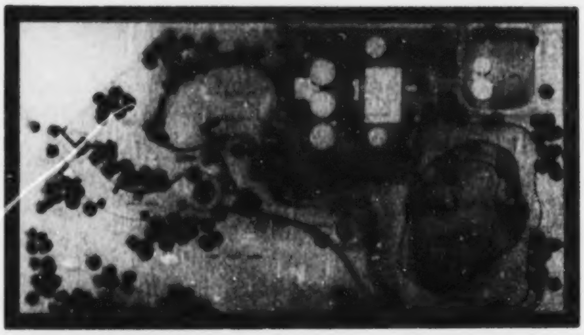
The Lebanon wastewater treatment plant provides conventional primary sedimentation and activated sludge secondary treatment. The effluent from this treatment normally contains 10 to 20 mg/l of suspended solids, about the same level of biochemically oxygen-demanding (BOD) materials, and 600-700 mg/l of dissolved salts. The processes being evaluated at Lebanon to remove the suspended solids, organic materials and dissolved salts include: filtration, chemical coagulation, activated carbon adsorption, electrodialysis, and reverse osmosis.

Following are short descriptions of some of the full-scale research demonstration projects sponsored by the Environmental Protection Agency's Municipal Technology Research Program:

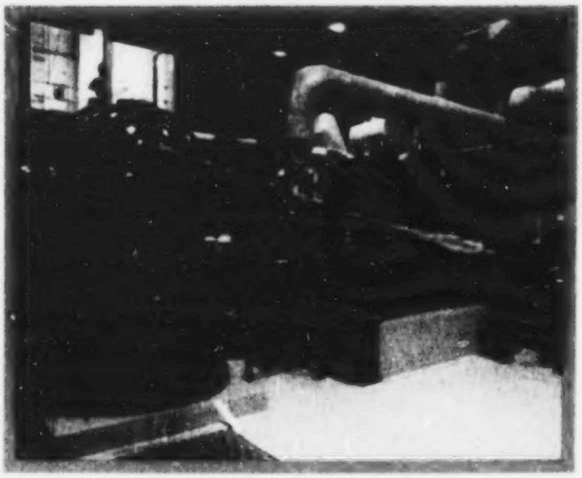
1. ***"Advanced Physical-Chemical Wastewater Treatment Facility" - Levitt & Sons, Inc.*** An advanced wastewater treatment facility to serve 130 homes has been developed by ITT Levitt & Sons and AWT Systems. The facility, a physical-chemical treatment system, is constructed inside a typical neighborhood house, requiring only a one-quarter acre building lot. A conventional waste treatment plant serving a community of comparable size would require approximately six acres of land. This treatment facility is designed to remove 98% of the suspended solids in the wastewater, and more than 95% of the biochemical oxygen demand (BOD), dissolved organics, and phosphorus. Yet the facility is completely enclosed in a building to blend architecturally with the surrounding homes in the area.

The treatment scheme includes screening, chemical addition, clarification, and magnetic filtration. Activated carbon will follow and a fluidized bed reactor will be used to incinerate the sludge and also regenerate the spent carbon. The polished effluent from the carbon adsorption column will be chlorinated before discharge to the receiving stream. This facility is located in Freehold, New Jersey and treatment operations began in June 1972. A one year evaluation study is currently underway.

2. *"Park Development With Wet Digested Sludge" - Metropolitan Sewage District of Seattle, Washington.* Ultimate disposal of digested sludge is one of the more difficult problems associated with waste treatment. In July 1969, the community of Seattle embarked on a program to investigate and demonstrate the feasibility of using digested wet sludge as a landfill material. The following requirements were established for the sludge: it must have proper settling characteristics; be capable of reducing its high water content; exhibit no undesirable interactions with underlying soil layers; and possess acceptable structural characteristics. This four-year study has examined all the above requirements and found that the digested wet wastewater sludge could provide adequate landfill material. METRO began actual fill operations in 1971 as a means of developing an urban recreational park land by filling an intertidal test area. This project has evaluated this technique for one year and a report on this work will be available to the public in the near future.



3. *"A Combined Sewerage Collection and Treatment Facility" - Mt. Clemens, Michigan.* The combination of control measures and treatment processes to provide the complete system for storm and combined sewer pollution control is demonstrated by this unique, forward-thinking project. The City of Mt. Clemens, Michigan, has constructed a system which utilizes three artificial ponds for storage, flow equalization and treatment. The three lakelets are combined with microscreening, surface aerators, and high-rate filtration to produce a highly treated effluent which is disinfected using chlorine. The final lakelet will eventually be used for non-contact recreation purposes, including boating and fishing. The site has been landscaped attractively and will be used as a park.



4. *"Boston University Bridge Storm Water Detention and Chlorination Station" - Boston, Mass.* Disinfection of treated combined sewer overflows is an important factor in protecting waters used for water supply and recreational purposes. Normally large amounts of chlorine or sodium hypochlorite are required and pose potential safety hazards and storage problems. An advanced electrolytic hypochlorite generator has been developed for the on-site production of sodium hypochlorite. The prototype of this generator is being evaluated in this project. For applications requiring more than 500 lbs. of hypochlorite per day, projected costs are three to four cents per pound. Disinfection costs using the on-site hypochlorite generator are competitive with liquid chlorine costs, while safety hazards are reduced. The storm water detention facilities have been operating since 1970, while in-situ production of sodium hypochlorite started in March 1972.

5. *"Demonstration of Waste Flow Reduction from Households" - General Dynamics.* Eight homes in Groton, Conn., have been selected to demonstrate the feasibility of using water saving plumbing devices and water recycle schemes. Work has consisted of installing flow reduction devices, determining costs versus water savings, and evaluating the acceptability to the homeowners. The work being performed is divided into the following phases:

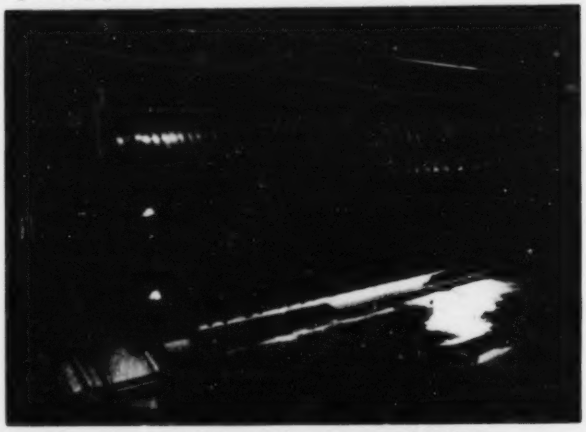
1. Meters have been installed in the test homes to determine the pattern of water usage for a six-month period.
2. Shallow-trap toilets (5 homes), dual flush toilets (3 homes), flow restricting shower heads (8 homes) have been installed and water recycle systems have been used in two of the homes. Reductions in water use for a twelve-month period are being recorded.
3. Water saving devices will then be removed and the plumbing returned to normal. Metering of water usage will be continued for six months to provide an additional check on the basic water use patterns.
4. A comprehensive report will then be prepared. Initial findings since the installation of the various water-saving devices indicate that an average decrease in water usage when using these devices in the home can be from 9 to 25%. Water savings vary greatly depending on each homeowner's water use habits.

6. *"Economical Residential Pressure Sewage System With No Effluent" - Grandview Lake Lot Owners Association, Columbus, Indiana.* This project involves a large-scale (72 homes) pressure sewer demonstration utilizing small-diameter (3-3½") plastic pipe. Individual home pump-storage-grinder units and septic tank effluent pumping units have been installed. The wastewater is pumped from these units through a PVC pressure sewer and is transported, independent of topographical conditions, to a two-stage lagoon for treatment. The effluent from the lagoon is then used for spray irrigation on a two acre hay field. Various commercially available pump-storage-grinder units along with several locally fabricated units are being evaluated. This project began operations in 1971 and has demonstrated that this method may be a feasible alternative to septic tank treatment systems in areas where gravity sewers are economically prohibitive.

POLLUTION CONTROL RESEARCH

7. *"Development, Demonstration, and Evaluation of Physical-Chemical Treatment of Combined Storm-Sanitary Sewage" - Battelle Memorial Institute.* At Albany, New York a 100,000 GPD mobile physical-chemical pilot plant utilizing powdered activated carbon has been constructed and evaluated. The treatment process consists of raw wastewater initially contacted with powdered carbon, coagulated by alum addition and polyelectrolytes, and then passed through a tri-media filter. The solids from the clarifier, composed of raw sewage solids, powdered carbon, and aluminum hydroxide floc, are dewatered by centrifugation with the powdered carbon acting as a dewatering aid. The dewatered solids are passed through a fluidized bed furnace. Alum is recovered by acidifying the regenerated carbon slurry from the furnace. The recovered carbon and alum are recycled as an acidified slurry and added to the raw sewage with the makeup carbon. During initial treatment operation the process consistently produced a high quality effluent from raw wastewater. Removals greater than 90% BOD, 90% COD, and 90% suspended solids were demonstrated. Settled effluent turbidities were less than 1 JTU. Initial plant operations began in 1971.

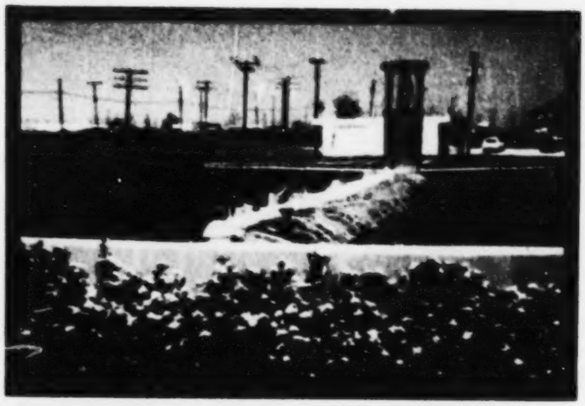
8. *"Demonstration of the Pure Oxygen Aeration Process to Upgrade Existing Waste Treatment Plants" - New York City Department of Water Resources.* In this project, one of the 20 MGD aeration bays at the Newtown Creek Pollution Control Plant in Brooklyn, New York has been converted to the Linde Corporation's pure oxygen aeration process. The project will demonstrate the applicability of refitting an overloaded or high rate waste treatment facility with an oxygen aeration unit to improve plant performance without new investment in additional aeration tank capacity. Nitrification will be examined and the applicability of mineral addition to the oxygenation system as a means of phosphate removal will be evaluated. Effects of diurnal flow variation will also be examined at the design throughout. The demonstration project went on-line in March 1972 and evaluation data will be gathered during a twelve month operating period.



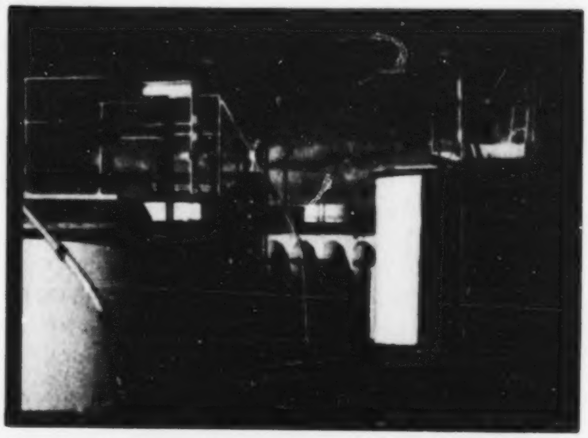
9. *"Use of Fly Ash Filter Aid for Sewage Solids Dewatering and Disposal" - Cedar Rapids, Iowa.* The City of Cedar Rapids is demonstrating the use of fly ash as a filter aid for sewage solids dewatering and disposal. Currently, both sludge incinerator ash and fly ash are being used as filtration aids in the pressure filtration of an anaerobically digested combined primary and trickling filter sludge. Pilot plant tests have indicated that due to the nature of the sludge from the trickling filter plant other alternate methods of pretreatment would incur severe economic penalties. On the other hand, the chemical ingredients in the fly ash, which is obtained at no cost, permit adequate dewatering at minimum cost.

In addition, the trace minerals in the fly ash and the plant food value from the sludge constitute a useable soil conditioner. Cedar Rapids uses this sludge as a soil conditioner and fertilizer in their parks.

10. *"Advanced Wastewater Treatment as Practiced at South Lake Tahoe" - South Lake Tahoe, Calif.* Under an EPA demonstration grant, a 7.5 MGD advanced wastewater treatment plant was constructed and operated at the South Tahoe Public Utility District in South Lake Tahoe, California. Two principal purposes of the project were to evaluate the recovery and reuse of lime as a coagulant in tertiary treatment, and to investigate ammonia stripping as a means for nitrogen removal from tertiary effluent. The work also included a comprehensive study of the efficiency, reliability, and economy of a tertiary sequence of treatment consisting of conventional activated sludge, followed by lime treatment for phosphate removal, ammonia stripping, two-stage lime recarbonation, mixed media filtration, granular activated carbon adsorption of dissolved organics, and chlorination. Granular carbon is thermally regenerated and reused, spent lime mud is recalcined and reused, and all waste organic and chemical sludges are incinerated. The results of this project have been publicized throughout the world as this work has been the forerunner in advanced wastewater treatment technology.



11. *"A Demonstration of Enhancement of Effluent from a Trickling Filter Plant" - Richardson, Texas.* This project demonstrates upgrading the treatment of wastewater in a medium-sized (1.5 MGD) plant by chemical addition. Controlled dosing of alum in the secondary clarifiers has demonstrated the capability of improving suspended solids removal and precipitating soluble phosphorus in the wastewater. In addition, batch and continuous treatment of digester supernatant has shown a marked improvement in overall treatment plant performance. This project has shown that a typical trickling filter treatment plant can easily upgrade its treatment capabilities at very minimal capital costs by using chemical addition and by employing good plant operation.



12. *"Physical-Chemical Treatment of Municipal Waste" - Eimco Corp.* The feasibility of physical-chemical treatment of raw sewage by chemical coagulation followed by adsorption using powdered activated carbon and dual-media filtration is demonstrated by this project. The powdered carbon is regenerated using a fluidized bed incineration. This treatment combination produces a high quality effluent which could have a potential number of reuse possibilities.

Operational evaluation of this treatment system is currently underway. All work is being conducted at Salt Lake City, Utah, where this treatment system has been constructed.

INDUSTRIAL POLLUTION CONTROL RESEARCH PROGRAM

The basic goal of the EPA RD&D program for industrial pollution control is to obtain proven pollution abatement methods at reasonable costs. This program has as its ultimate goal the elimination of industrial waste discharges through the recycle of process water. This will occur when each industrial user treats its wastewater to a quality equal to that of the intake water. At this point, economics will dictate that the manufacturer "close the loop".

It is recognized that this goal requires a stepwise series of technical achievements in each industry. Because of the complexity of both the processes and economics of American industry these improvements can only be accomplished by tapping the immense technical capability of industry itself. Thus, the EPA industrial pollution control program is directed to providing incentives for private industry to develop and demonstrate innovative solutions to industrial pollution problems. This is done through demonstration grants and, to a lesser degree, through research contracts.

If a private company 1) has a technically sound proposal for solving an industrial pollution problem; and 2) the successful completion of this project would advance the technology for solving an important pollution problem, the basic conditions for consideration for a demonstration grant are met. The ultimate goal of any demonstration grant is a full-scale system on line in a commercially operating manufacturing facility. In return for this partial funding of the solution of his pollution problem, the grantee must prepare a project report making the technical information obtained available to other industries. Other companies using this technology receive no Federal funding support.

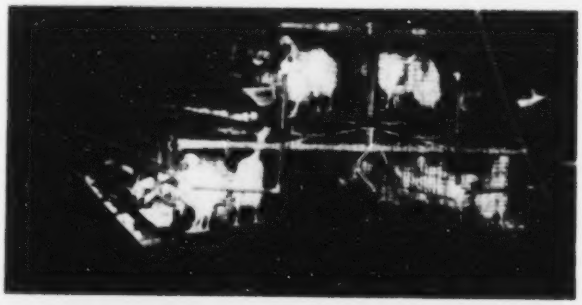
The Applied Science and Technology Branch of the Technology Division (see Figure 2) administers the non-municipal water pollution control programs including the industrial program. The technical staff for this program is located at Washington, D. C., the EPA laboratories, and regional offices throughout the country.

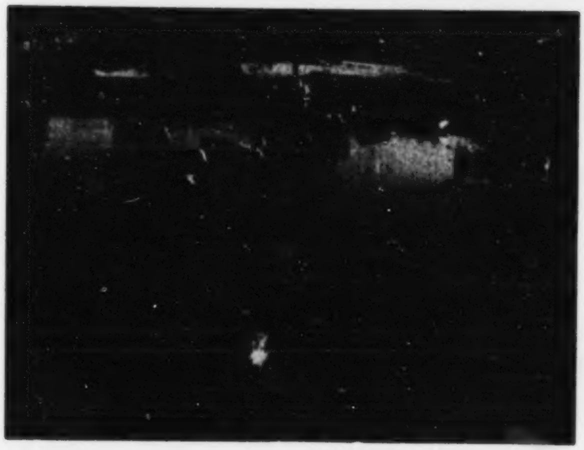
The program is subdivided into seven elements to allow reasonable management:

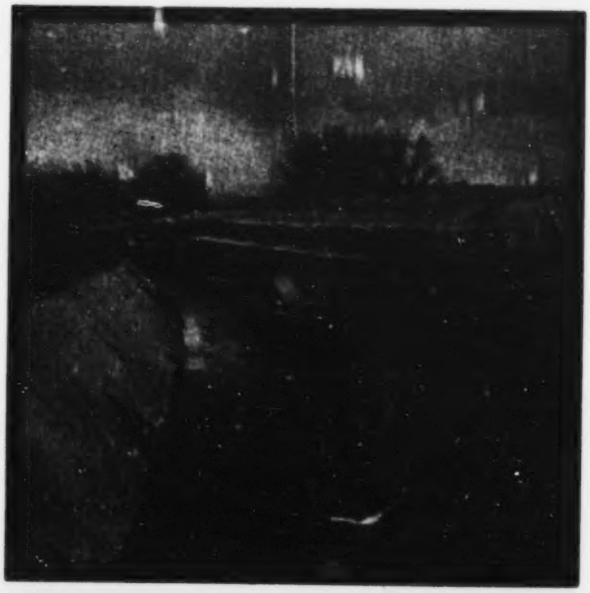
1. Agricultural Sources
2. Food, Paper and Miscellaneous Sources
3. Heavy Industrial Sources
4. Hydrologic Modification
5. Mining Sources
6. Oil and Hazardous Materials
7. Transportation Sources

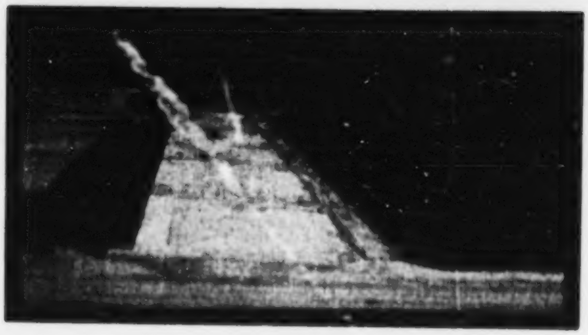
The following illustrates the activities of each of the Applied Science and Technology Program Elements. It would be naive to feel that the EPA programs will provide the answers to all of the nation's industrial pollution problems. This would require funding many times over existing or projected levels. It is the purpose of these programs to provide funding in key areas where government assistance can prove concepts and provide direction when the private sector hesitates.

Agricultural Sources. The Agricultural Sources program deals largely with non-point sources of pollution associated with rural activities. A major area is feedlot management where uncontrolled animal wastes can present a major problem. Irrigation return flow and pesticide runoff are two other major concerns of the program. Technical staff administering the program are located at the Robert S. Kerr Water Research Center in Ada, Oklahoma; the Southeast Water Laboratory in Athens, Georgia; and in Washington.









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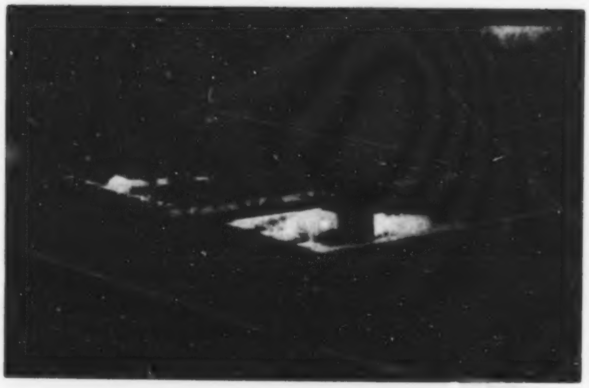
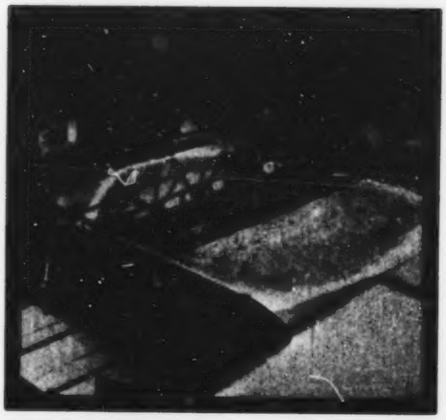


Food and Paper Industrial Sources. The vast American food industry is comprised of companies ranging from some of the largest in the United States to small family owned businesses. The processes utilized are equally varied. Seasonal variations in production add a further complication. The EPA research program in this area aims at encouraging those key areas which will have broad application over the industry. Major innovations in pollution control in the food area supported by EPA have been dry caustic peeling, and the conversion of dairy whey to a food product. Technical staff for this area are located at NERC-Corvallis and in Washington. The Southeast Water Laboratory in Athens, Georgia and the Robert S. Kerr Water Research Center in Ada, Oklahoma also contribute to this effort. The pulp and paper industry is likewise an extensive industry touching upon the daily life of every citizen. By any measure this industry has some of the severest pollution problems in the nation. Through a continuing effort relief from this problem is perhaps at last in sight. EPA has supported many projects in this industry leading to major advancements in technology. This program element is especially interested in developing technology which will lead to the economic use of closed loop systems. The technical staff for this program is located at NERC-Corvallis, and in Washington, D.C.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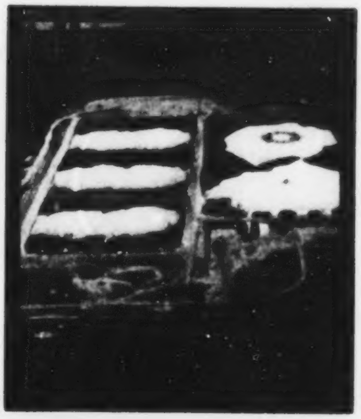
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1 Large scale pilot plant for paper waste treatment.
2 Aeration system for paper mill waste.
3 Dry caustic peeling of fruit and vegetables offer major reductions in waste water.
4 A pilot system studing new techniques which use a minimum of water on vegetables.
5 Spray irrigation using food processing wastewater.

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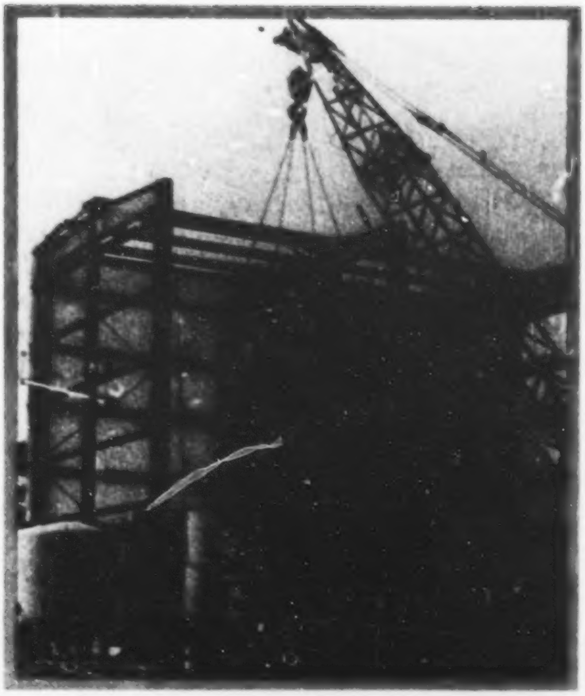

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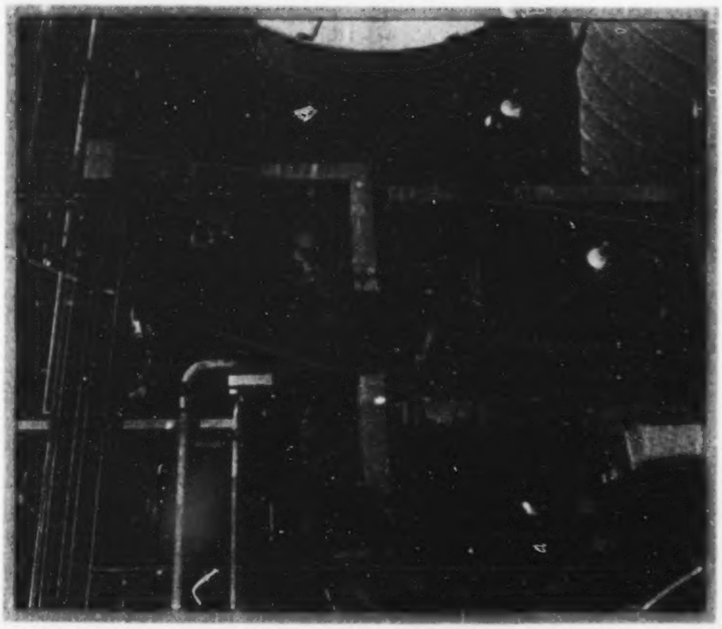

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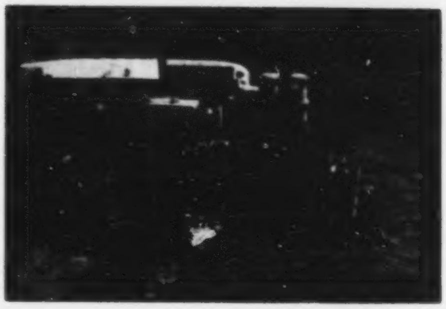

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1 A system for neutralizing and removing the iron from steel mill pickle liquor waste.

2 A fertilizer complex installs a system for treating its wastewater.

3 Scientist from the Robert S. Kerr Laboratory in Ada, Oklahoma, are analyzing petroleum plate wastes in an effort to characterize wastes from this industry.

4 An activated carbon pilot plant for treating petroleum refinery wastes.

5 A reversr osmosis pilot study for cooling tower blowdown.

6 An integrated system for treatment of pickling solutions in a copper wire manufacturing process was a major sucess.

Heavy Industrial Sources. Metals, chemicals, petroleum, power, textiles, rubber, and plastics are included in this very broad program. These industries produce wastes which cannot be adequately characterized by the traditional concepts of BOD and suspended solids. The wastes from these plants contain hundreds of materials many of which require special treatment. Pollution control, in this program especially, requires a close look at process modifications as well as add on waste treatment. This program, like most EPA programs, related to industrial sources, is basically interested in technology which can ultimately lead to the economic use of closed loop water systems. The technical staff supporting this program are located at the Edison Water Quality Research Division; the Southeast Water Laboratory in Athens, Georgia; and the Grosse Ile, Michigan Field Station.

Hydrological Modifications. This element covers pollution from construction, dredging, landfill, and water resources development. Sediment from these projects is a major source of water quality deterioration. Two areas of great interest in this program are improved erosion control practices for subdivisions and techniques which lead to a total systems approach to dredging. The technical staff is located in Washington and the Grosse Ile Field Station.

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1-3 Acid Mine Drainage enters a clean West Virginia stream and destroys it'.
4 A self contained suit for use in inert atmosphere mining.

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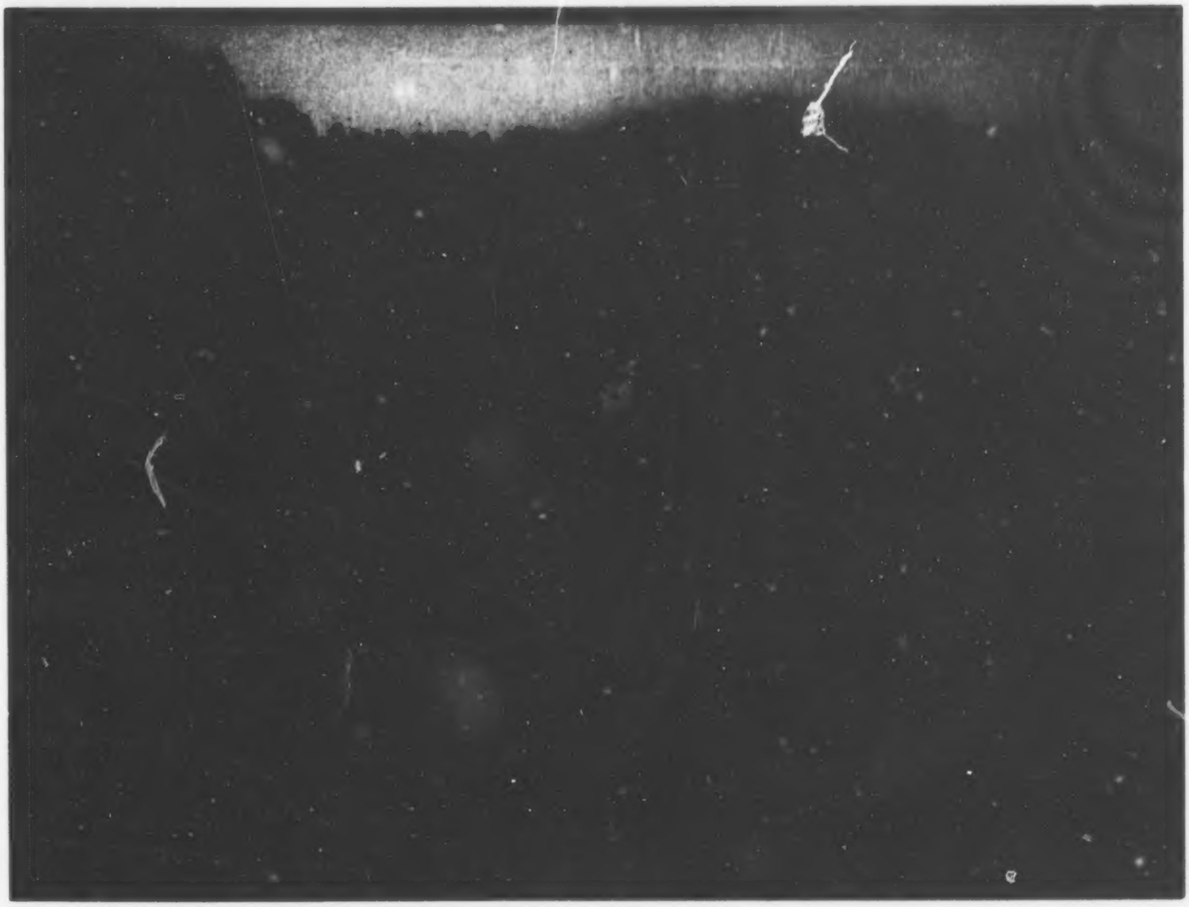

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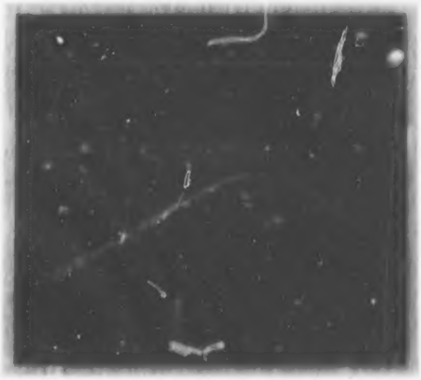

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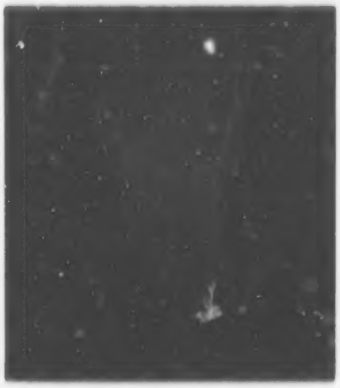

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1-4 Restoration Projects can reclaim a damaged environment.

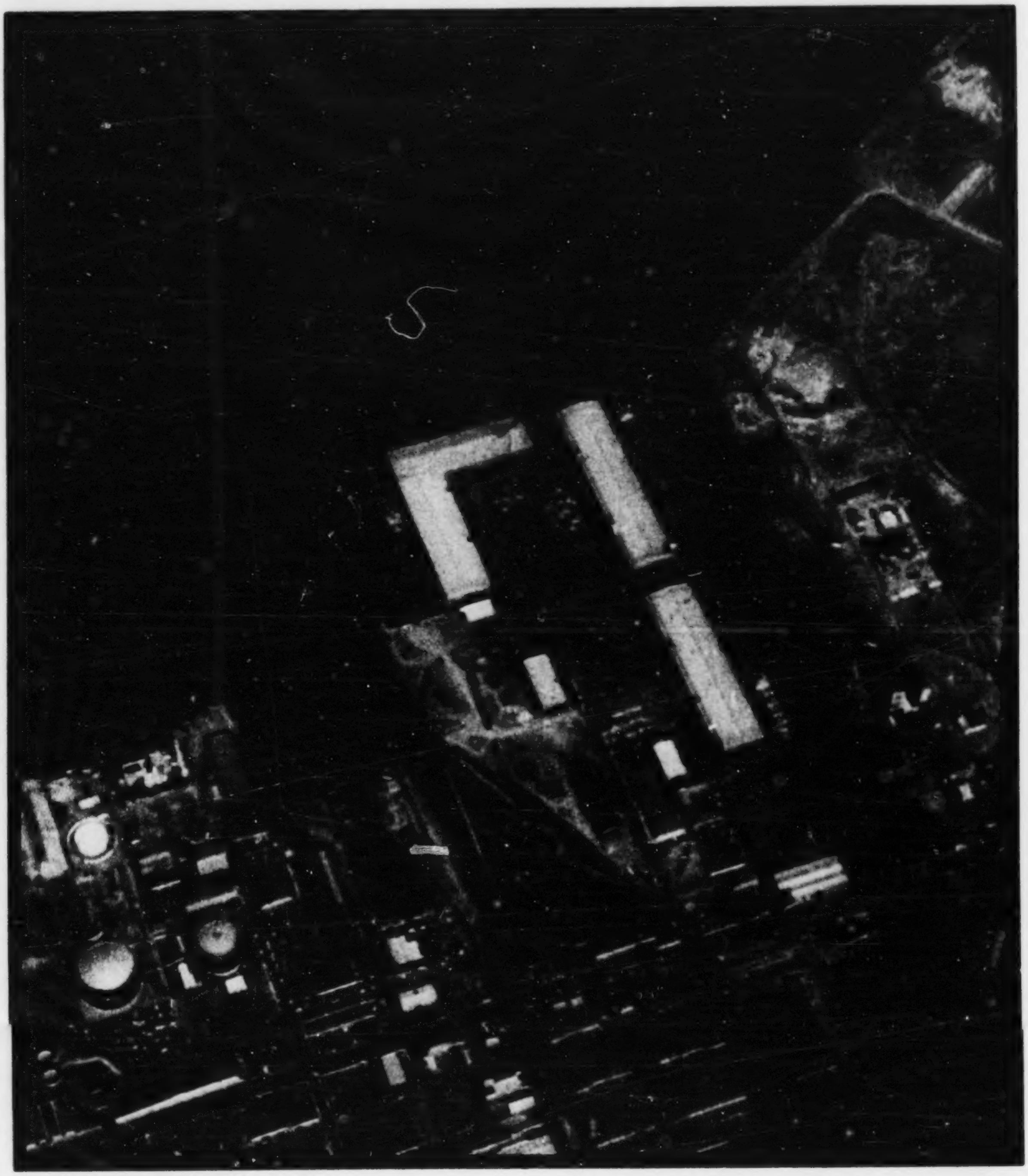
5 A limestone barrier will treat acid drainage with low iron content.

6 An acid mine waste treatment plant for the more complex mine wastes.

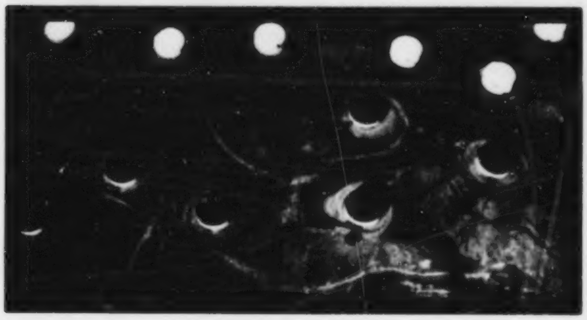
Mining Sources. The effect of acid mine drainage has been disasterous to many of the nation's streams. Abandoned underground and surface mines contribute a major portion of this waste. New technology is the only hope for relief. Other areas covered by this program are oil shale, petroleum, and phosphate mining. Urgent needs within the program are:

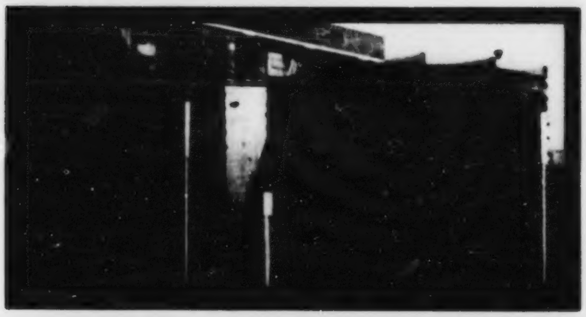
1. Mining methods which minimize the exposure of pyrites and coal to the environment.
2. Methods for closing mines which will eliminate pollution from abandoned mines.
3. Uses for the neutralization sludge produced from treatment of acid mine wastes.
4. At-the-source control methods for abandoned underground mines.
5. Techniques for phosphate mining and beneficiation which will produce a more easily settled phosphate slime.

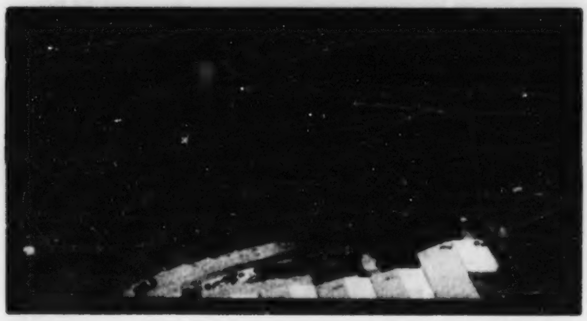
The technical staff is located in Washington; the Robert S. Kerr Water Research Center in Ada, Oklahoma; the Southeast Water Laboratory in Athens, Georgia; and the Crown, West Virginia Field Station.



Oil and Hazardous Materials Spill Program. The spilling of oil and chemicals continues to take its toll of the environment. The oil and hazardous spills program is aimed at developing equipment and processes for the prevention and cleanup of spills. The major effort in any spill control program must be in prevention, but some spills will continue and countermeasures are also essential. The EPA program to date has resulted in engineering concepts and prototypes now being tested in actual spill conditions. Skimming devices, cleanup equipment, and surveillance techniques are being developed for oil and chemical spills. The technical staff for this program is located in Washington and the Edison Water Quality Research Division.







Transportation Sources. Primarily concerned with watercraft, this program is aimed at encouranging the development of technology for the elimination of pollution from these sources. Projects are underway for the evaluation of the pollutional effects of outboard motors, on-board waste treatment systems for watercraft, and on-shore treatment facilities.

HOW TO APPLY FOR AN EPA RESEARCH, DEVELOPMENT OR DEMONSTRATION GRANT OR CONTRACT

Under the provisions of the Federal Water Pollution Control Act of 1970 the Environmental Protection Agency is authorized to conduct research and development activities. These activities may be completed through the in-house effort of Federal laboratories, or they may be carried out through the funding and sponsorship of research and development grant and contract programs.

Section 6 of the Federal Water Pollution Control Act, as amended, provides broad authorization to conduct research, investigations, training, and information programs. Funds are provided to carry out the provisions of this section, including research by grants and contracts. Projects sponsored under this section of the law may cover a broad range of water pollution control activities. Specific research and development grant and contract types are defined as follows:

Research Grants and Contracts. Awarded to public or private agencies, institutions and individuals to assist in supporting research projects relating to the causes, control and prevention of water pollution. Projects supported are directed toward the discovery and development of new information and technology in the chemical, physical, biological and social sciences, in engineering, and in administrative aspects related to water pollution control.

Research Grants are awarded for less than 100 percent of the project cost.

Research Contracts may be awarded for up to 100 percent of the project cost.

Demonstration Grants and Contracts. Awarded to public or private agencies, institutions and individuals to assist in investigations and studies of an applied nature, and to develop and demonstrate the feasibility of new methods related to the causes, control and prevention of water pollution. Also supported are projects which evaluate and apply new information and technology.

Demonstration Grants are awarded at less than 100 percent of the project cost.

Demonstration Contracts may be awarded for up to 100 percent of the project cost.

Section 6 of the Federal Water Pollution Control Act provides authorization for research and development grant and contract programs for specific pollution problems, namely, storm and combined sewer overflows, advanced waste treatment, and industrial waste pollution control. Projects sponsored under this section require matching funds, the amount varying slightly depending on the specific problem. Grants and contracts for the first two purposes listed above require State approval. A brief description of each program follows:

Storm and Combined Sewer Projects. Grants and contracts are awarded to assist projects which will develop and/or demonstrate new or improved methods of controlling the discharge into any waters of untreated or inadequately treated sewage or other wastes from sewers which carry storm water and sewage or other wastes.

Grants are awarded to States and interstate agencies, municipalities, and intermunicipal agencies for up to 75 percent of the estimated reasonable project cost.

Contracts are awarded to public and private agencies, institutions, and individuals for up to 100 percent of the project cost.

2. *Advanced Waste Treatment Projects.* Grants and contracts are awarded to assist projects which will develop and/or demonstrate advanced waste treatment or water purification methods (including the temporary use of new or improved chemical additives which provide substantial immediate improvement in existing treatment processes). Grants and contracts are also awarded for new or improved methods of joint treatment systems for municipal and industrial wastes.

Grants are awarded to States and interstate agencies, municipalities and intermunicipal agencies for as much as 75 percent of the estimated reasonable cost of the project.

Contracts are awarded to public and private agencies, institutions and individuals for up to 100 percent of the project cost.

3. *Industrial Waste Treatment Projects.* Grants and contracts are awarded to public and private agencies, institutions, and individuals to support research and demonstration projects for the prevention of pollution of waters by industry, including, but not limited to, treatment of industrial waste. To be supported, projects must develop or demonstrate methods having industry-wide application.

Grants may be awarded for as much as 70 percent of the estimated reasonable cost of the project; the maximum award for any one project is $1 million.

Contracts may be awarded for up to 100 percent of the project cost.

For details concerning research, development or demonstration grants or contracts, and forms for submission of applications, write to:

Grants Administration Division
Environmental Protection Agency
Washignton, D.C. 20460

Each application received by the Environmental Protection Agency undergoes a comprehensive review process which includes the following:

1. A review of relevancy to the cognizant EPA research program.
2. Technical evaluation.
3. Review regarding regional policies.
4. National research program priority need.
5. Availability of funds.

Please allow at least 90 days after application submission for EPA to complete its review.

It is strongly suggested that if one is interested in applying for an EPA grant or contract, he or she should first contact the cognizant research person directly responsible for that area of research. This contact can be done by a personal visit or by writing a short (two-page) letter or preproposal describing the intended research, how it will be accomplished, and a general indication of approximate cost. This initial preproposal can save both the government and the potential applicant time and money for a quick answer generally can be given as to possible interest, research needs and availability of potential funding.

In addition, when a specific research study is desired, a Request for Proposals (RFP) will be printed in the *Commerce Business Daily.* This RFP will give a brief statement as to what work is desired and from whom additional information can be obtained.

In his message to Congress regarding the establishment of the Environmental Protection Agency, President Nixon recognized the ineffectiveness of individual programs designed along media lines. The President's message indicated that " . . . for pollution control purposes the environment must be perceived as a single, interrelated system. . . . A far more effective approach to pollution control would: –Identify pollutants. –Trace them through the entire ecological chain, observing and recording changes in form as they occur. –Determine the total exposure of man and his environment. –Examine interactions among forms of pollution. –Identify where in the ecological chain interdiction would be most appropriate."

Consistent with this approach, the *Office of Monitoring* serves as the focal point for all Agency monitoring activities. It provides that coordinative link among the Agency's more than 50 single-media/category oriented monitoring programs required to achieve EPA's broad monitoring goals in the most effective manner.

Program control over the 50-odd monitoring activities resides with the eight headquarters programs making the most direct use of the data being gathered. These activities are carried out by a total of 51 laboratories and field stations operating under the regional offices, the National Environmental Research Centers, Office of Radiation Programs, Office of Pesticides Programs, and Office of Water Enforcement.

The Office of Monitoring works closely with other EPA programs to ensure that:

·The individual monitoring activities, collectively, provide sufficient information to permit a complete and accurate assessment of the total environment.

·The data generated by the many individual programs are reliable and will readily lend themselves to multimedia/category assessment.

·The most up-to-date single and multi-media monitoring techniques are utilized to the fullest extent to produce comparable data by all programs with monitoring responsibilities.

·Research and development needed to increase the effectiveness of all monitoring operations are identified for early implementation.

·All current and future monitoring objectives are met in an efficient manner.

To administer these responsibilities, the Office of Monitoring is divided organizationally into three Divisions (see Figure 1): Planning and Review; Advanced Techniques; and Quality Assurance. Together, they provide an objective overview of all the separate monitoring activities inherited by EPA.

The primary responsibility of the Planning and Review Division is to assimilate and continuously update a long-range Agency-wide monitoring strategy and to review and concur on all monitoring plans and budgets requiring headquarters approval to ensure conformity with the strategy. In the strategy development and updating, close attention is given to all possible means by which multimedia data analysis can be facilitated.

The Advanced Techniques Division is responsible for the identification and support of research needs in the area of remote and in-situ sensors. It conducts laboratory and field tests of newly developed instruments and techniques to determine their adequacy in meeting EPA's monitoring requirements. It is also responsible for planning and integration of resources and technology into advanced monitoring systems. In addition, the Advanced Techniques Division is the focal point for the operation of research monitoring networks.

The Quality Assurance Division is responsible for the design and operation of an Agency-wide monitoring methods standardization and quality control program. Such a program is needed to assure and document the accuracy, validity, and compatibility of all environmental measurements. It involves the evaluation and comparison of alternative methods, the selection of those methods serving as the Agency standards, the development and issuance of guidelines and procedures for carrying out a quality control program, directing the preparation and use of standard reference materials, and the operation of an intra- and interlaboratory quality control and certification program.

Through these activities the Office of Monitoring maintains a continuing awareness of the Agency's monitoring activities and provides guidance as appropriate to ensure that all appropriate monitoring goals are identified and achieved in the most effective manner.

EPA Regional Offices

Region	Address
I	Environmental Protection Agency John F. Kennedy Federal Bldg, Room 2304 Boston, Mass. 02203
II	Environmental Protection Agency 26 Federal Plaza New York, N.Y. 10017
III	Environmental Protection Agency 6th & Walnut Sts. Philadelphia, Penna. 19106
IV	Environmental Protection Agency Suite 300 1421 Peachtree St., N.E. Atlanta, Georgia 30309
V	Environmental Protection Agency 1 N. Wacker Drive Chicago, Ill. 60606
VI	Environmental Protection Agency 1600 Patterson Street, Suite 1100 Dallas, Texas 75201
VII	Environmental Protection Agency 1735 Baltimore Street, Room 249 Kansas City, Missouri 64108
VIII	Environmental Protection Agency 1860 Lincoln St., Suite 900 Denver, Colorado 80203
IX	Environmental Protection Agency 100 California Street San Francisco, Calif. 94111
X	Environmental Protection Agency 1200 6th Avenue Seattle, Washington 98101

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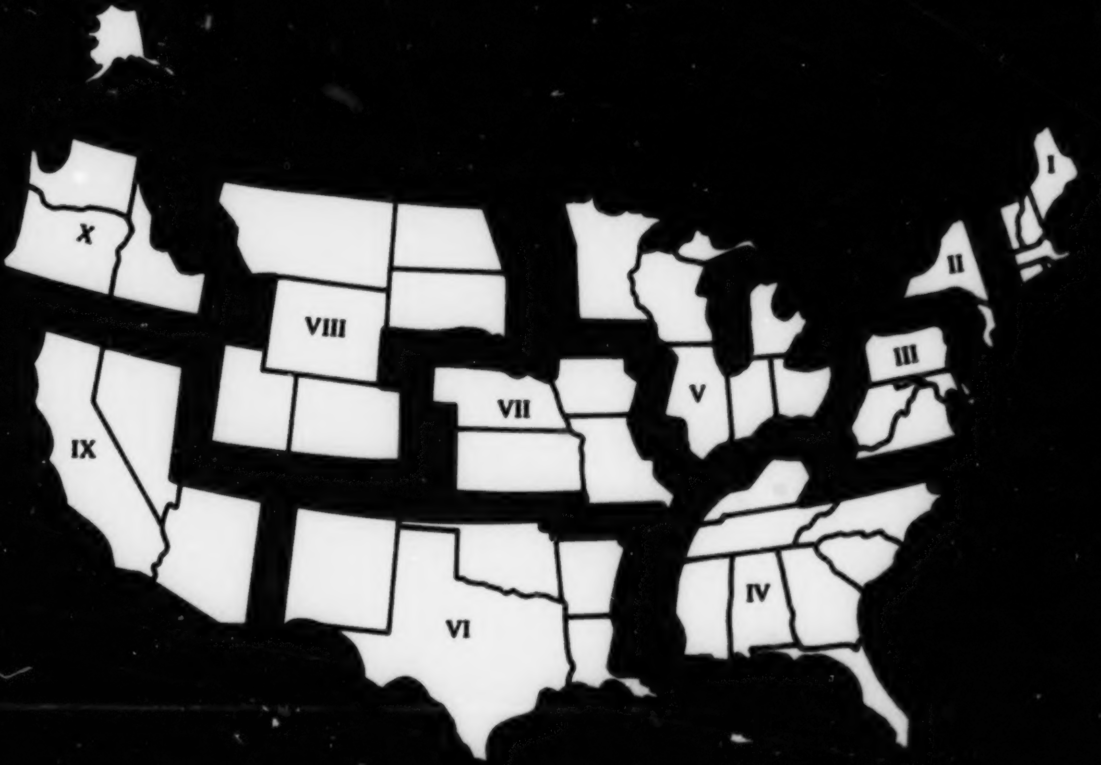
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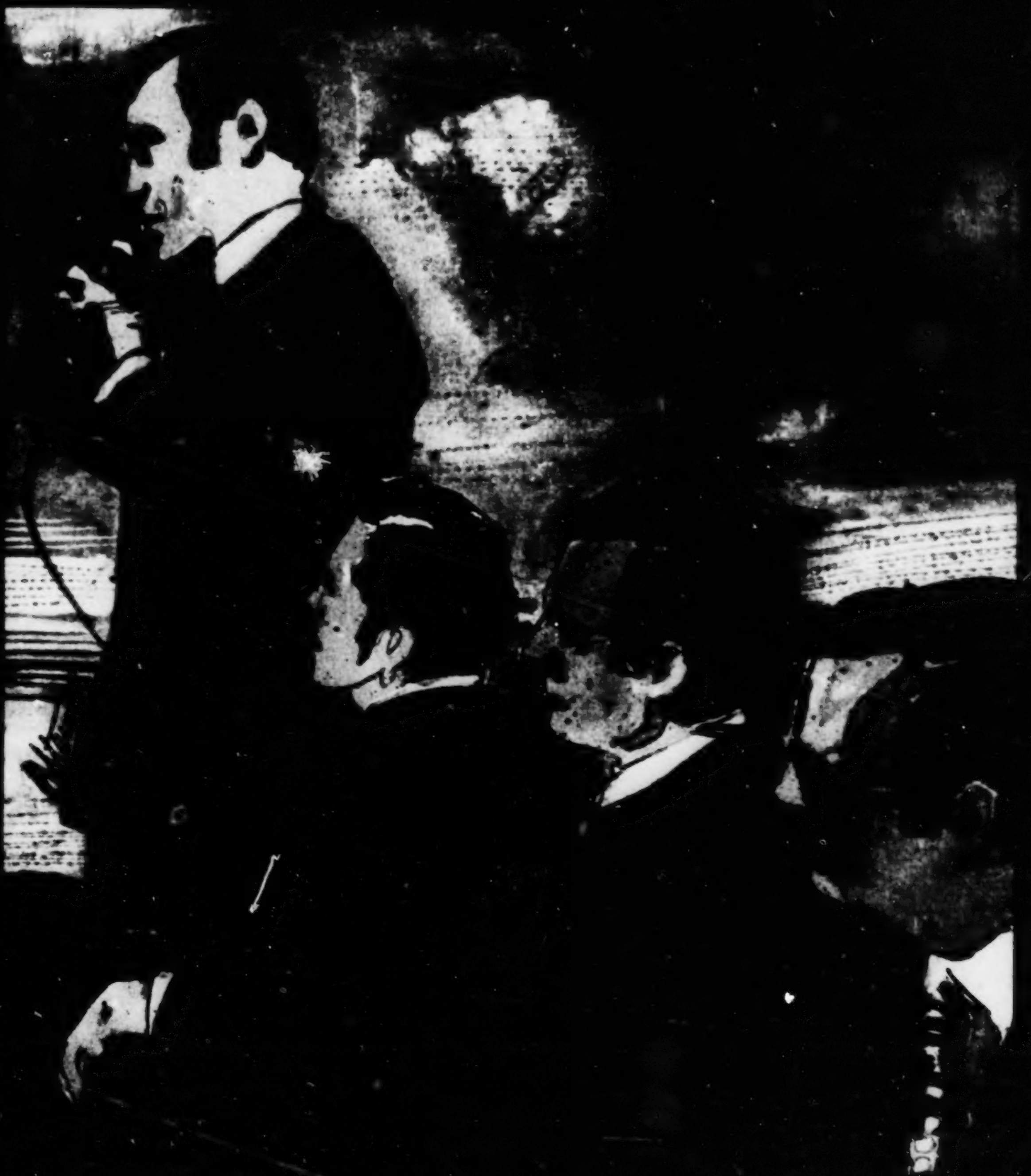
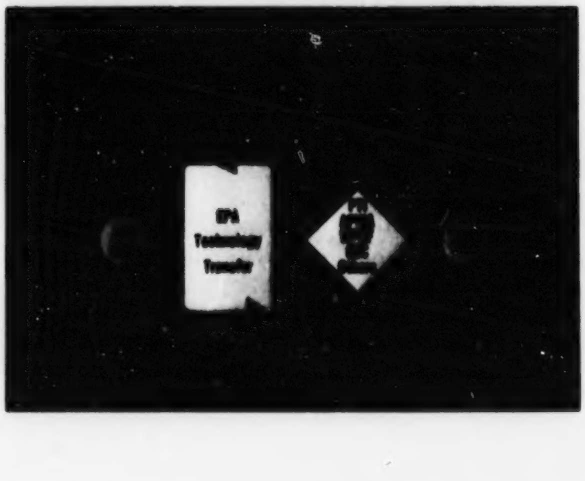


Technology Transfer

The formation of the Environmental Protection Agency marked a new era of environmental awareness. This Agency's goals are national in scope and encompass broad responsibility in the area of pollution control and abatement. A vital part of EPA's national water pollution control effort is the constant development and dissemination of new technology for wastewater treatment. It is now clear that only the most effective design and operation of wastewater treatment facilities, using the latest available techniques, will be adequate to meet the future water quality objectives and to ensure continued protection of the Nation's waters. It is essential that this new technology be incorporated into the contemporary design and construction of waste treatment facilities to achieve maximum benefit of our pollution control expenditures.

EPA has therefore launched an intensive effort to transfer technology to all potential users: engineers, administrative decision-makers, conservation groups and the general public. The Technology Transfer Program was initiated in October 1970, for the purpose of impacting the construction of municipal wastewater treatment facilities. The initiation of this program marked the first formalized environmental program of this nature in an effort to transfer technology from research and development to the users of that technology. Since October 1971, the program, which now operates under the EPA Assistant Administrator for Research and Monitoring, has expanded to include other areas of environmental concern.

Technology Transfer's objective is to effectively impact the construction, installation, and operation of pollution control and abatement facilities, to ensure that the latest viable technologies are transferred to potential users and eliminate the possibly large investment in obsolete facilities. The program's primary function is to bridge the gap between research and full-scale use by evaluating and transferring newly developed successful technologies to consulting engineering firms; municipal, industrial, and State design engineers; city managers; directors of public works; industrial managers; conservation groups; and others exerting influence over the design and construction of all pollution control and abatement facilities. A further goal is to firmly establish the newly emerging technologies as practical and feasible alternatives on a national basis, to be routinely considered and evaluated in the planning of these facilities. Technology Transfer accomplishes its objective of disseminating the latest practicable pollution control technological alternatives to all potential users by utilizing several tools such as seminars, technical and semi-technical publications; audiovisual media, and exhibits.

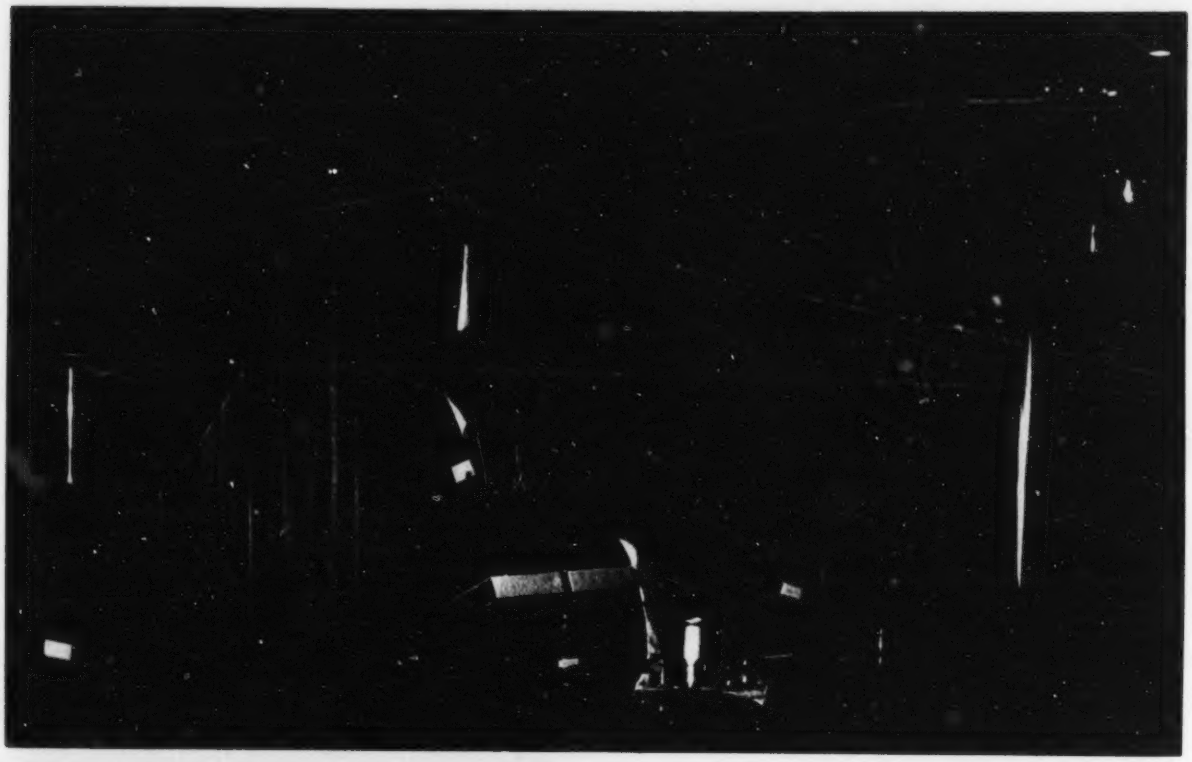


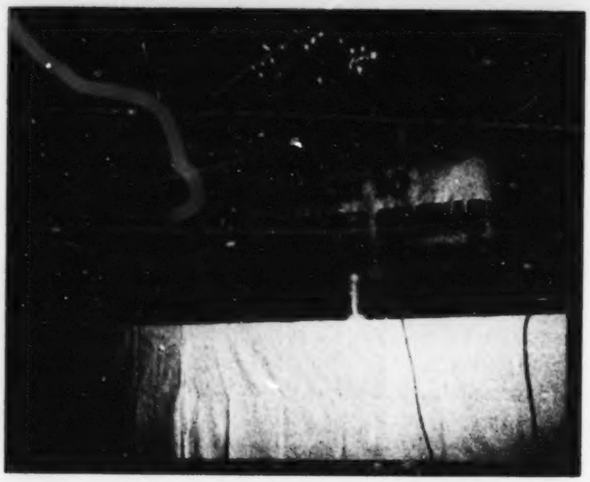
Seminars are oriented to meet the specific technology needs of the regions in which they are held, and participation at no charge is offered to consulting engineers and Federal, State and municipal officials and industrial waste engineers and officials concerned with pollution control and abatement.

One portion of the seminar program is a municipal series aimed at reaching those engineers involved in the design of municipal wastewater treatment facilities. Seminars in this series are held approximately once a month. Through August 1972, 15 of these seminars have been held throughout the nation:

Location	*Date*
Chapel Hill, N.C.	February 9-10, 1971
Cleveland, Ohio	April 22-23, 1971
Boston, Mass.	May 26-27, 1971
Charlottesville, Va.	June 8-9, 1971
Dallas, Texas	July 27-28, 1971
Kansas City, Mo.	September 8-9, 1971
Atlanta, Ga.	October 27-29, 1971
Seattle, Wash.	December 1-2, 1971
San Juan, P.R.	December 15-17, 1971
Anaheim, Calif.	January 5-6, 1972
New York, N.Y.	February 29, March 1-2, 1972
Anchorage, Alaska	March 28-29, 1972
Washington, D.C.	May 9-11, 1972
Syracuse, N.Y.	May 31, June 1-2, 1972
Pittsburgh, Penna.	August 29-31, 1972

A typical municipal design seminar lasts two and one-half days and is divided into 5 half-day sessions. The first



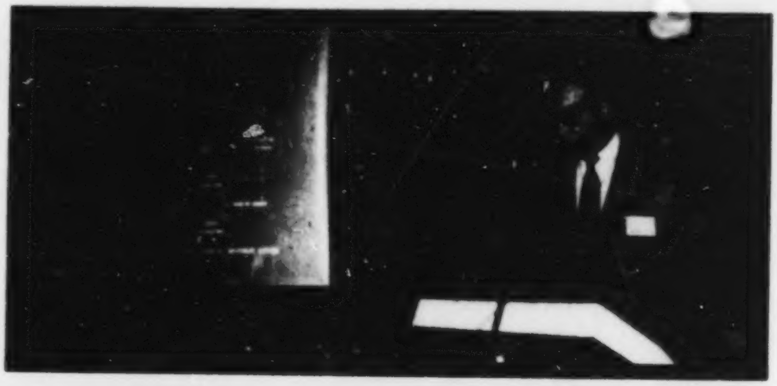


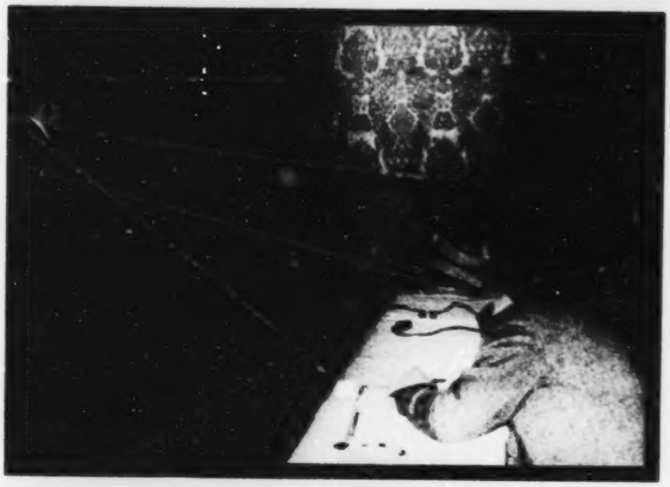
session is used for introductory discussions on timely pollution control issues and Federal and State policies and positions. The next three sessions are concurrent technical presentations of design information including criteria, costs, equipment and experience, on three topics relevant to the needs of the specific region (phosphorus removal, for example). A question and answer session concludes the seminar on the third day. Presentations at these seminars are made by eminent consulting engineers, equipment manufacturers, chemical suppliers, etc., experienced in the design of municipal wastewater treatment facilities with the assistance of personnel from the EPA National Environmental Research Centers. Some of the people who have participated in these municipal design seminars in the past include: Clair Sawyer, Donald Schwinn, Ariel Thomas – Metcalf & Eddy; James Laughlin – Shimek, Roming, Jacobs, & Finklea; Gordon Culp, L.G. Suhr – CH_2M/Hill; Donald Newton, Thomas Wilson – Greeley & Hansen; Vernon Stack, William Sitman – Roy F. Weston; Jack McKee – Camp, Dresser & McKee; K. Peter Devenis, Charles A. Maguire & Associates; William Wechter – Burns & Roe; Alan Plummer – Forrest & Cotton; Don Wood, Joseph Skelly – Swindell-Dressler; Jack Grainge – Canadian Environmental Protection Service; E. R. Baumann – Iowa State University; Russell Culp – South Lake Tahoe, Calif; Joseph Lagnese, John Parkhurst – President and Vice President, WPCF; Richard Sullivan – APWA; A.J. Diaper – Crane Corporation; Terry Campbell, Ron Wukash – Dow Chemical; E.A. Wilcox – Union Carbide; J.L. Rizzo – Calgon Corporation; David Walrath – Hazen & Sawyer; and Howard Eddy – EKONO.

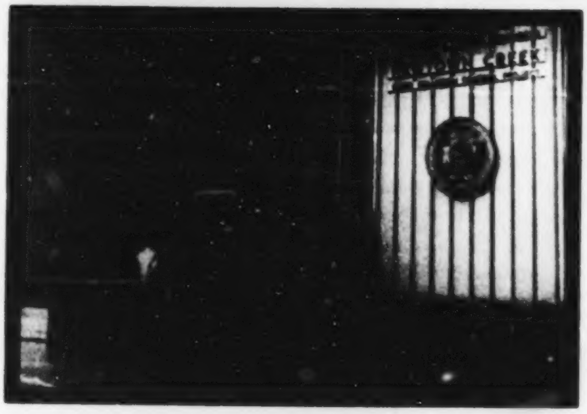
Technical sessions in municipal seminars to date have covered the following subject areas:

Nitrogen Control
Physical-Chemical Treatment
Phosphorus Removal
Upgrading Existing Wastewater Treatment Facilities
Oxygen Aeration
Suspended Solids Removal
Combined Sewer Overflows

Field trips are included with the seminar program where appropriate sites are available. Seminar attendees have toured such facilities as the 233 MGD Boston Metropolitan District Commission Combined Sewer Overflow Detention and Chlorination Station and the 20 MGD Pure Oxygen Aeration Project at the Newtowne Creek Wastewater Treatment Plant, New York City.







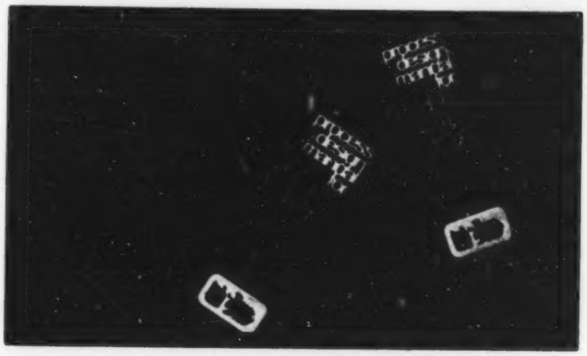
A series of industrial seminars aimed at helping the smaller manufacturers meet their obligations for improved pollution control is another portion of the seminar program. In this series, plant managers and members of the operating staff are invited to a two-day program in which the detailed problems associated with their particular industry are discussed. The sessions usually begin with a discussion of the permit system by a member of the EPA Permit Program. In the following technical *sessions the* technology capable of solving the key pollution problems in that industry are presented. Typical topics discussed are the problems of modifying an existing plant compared to building a new facility, waste treatment where land is limited, the value of the waste survey, monitoring, process modifications, by-product recovery, and preparing to tie into a municipal system. The seminars include case histories in which an engineer or manager closely associated with a successful project in the industry under consideration discusses his experiences. An explanation of the EPA Industrial Grant Programs and a special wrap-up session usually complete the program. To ensure that the seminars always address the most urgent needs of the industry to which they are addressed, representatives of the appropriate industries are consulted during planning of the seminar programs. The first industrial seminar was held in Atlanta, Georgia, September 1972, and included sessions on in-plant modifications to reduce pollution potential; pretreatment prior to discharging to a municipal system; and secondary treatment prior to discharging to a stream. A session on basics of waste treatment was also given and a discussion of the effluent permits for poultry processors was held.

The compilation and dissemination of information in the form of *publications* is a major effort of Technology Transfer. One objective is to present the large amount of experience, data, and criteria that has evolved from research, development and demonstration (EPA, industrial, university, etc.) in a form in which it can be more readily utilized by design engineers. To accomplish this, Technology Transfer has initiated a continuing series of highly technical publications. Currently available technical publications include:

- Process Design Manuals for
  - Phosphorus Removal
  - Suspended Solids Removal
  - Carbon Adsorption
  - Upgrading Existing Wastewater Treatment Plants
- Handbook for Analytical Quality Control In Water and Wastewater Laboratories
- Manual for Monitoring Industrial Waste Streams

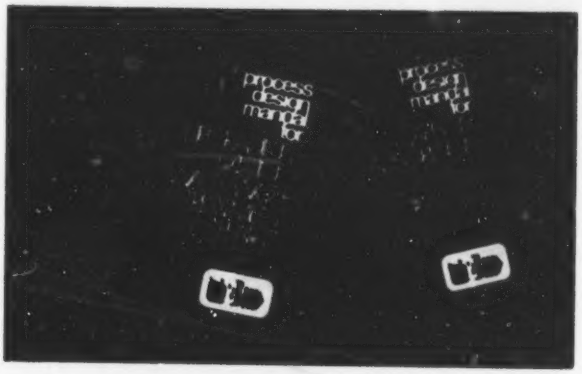
The four design manuals listed above were initially released at the annual WPCF Convention in San Francisco, October 1971. To date, 15,000 copies of each have been distributed at no charge. Each was prepared by a consulting engineering firm under contract to EPA with considerable technical input from the staff of the EPA Advanced Waste Treatment Laboratory in Cincinnati. It is felt that if engineers utilize the recommendations contained in these manuals when designing new or upgrading existing waste treatment facilities, a major impact can be made on improving the quality of wastewater treatment. In addition, the manuals will provide guidance to engineers so that they will be able to advise municipalities on the best methods to meet present and future water quality standards. Contracts with four consulting firms to update the design manuals are currently underway with completion estimated for early 1973. Revised editions of the manuals should therefore be available before summer of 1973. A brief description of each technical publication follows:

"Process Design Manual for Phosphorus Removal." This manual discusses phosphorus removal methods that have been found effective and practical for use in wastewater treatment plants. All the methods included involve chemical precipitation of the phosphorus and removal of the resultant precipitate. Precipitants include salts of alum and iron and lime. Included in the discussion of each treatment method is a description of the method, pilot or full-scale performance data, equipment requirements, design parameters, and costs.



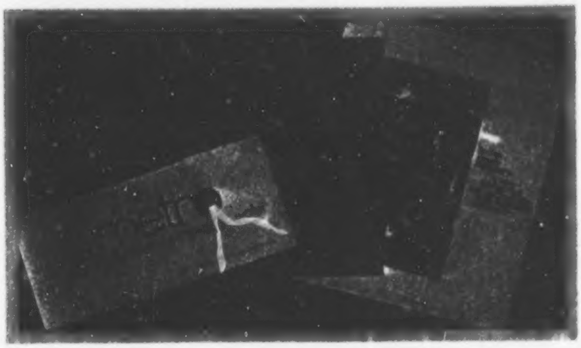
"Process Design Manual for Suspended Solids Removal." This manual comprises a compilation of information on the practice of suspended solids removal from municipal wastewaters. General engineering considerations are cited with respect to their impact on the design of treatment facilities. Specific processes utilized for suspended solids removal are described, discussed, and illustrated through the use of data from installations which have employed these processes. Aspects of the operation and maintenance requirements of the described unit processes are delineated, along with the overall estimated costs of construction and operation.

"Process Design Manual for Carbon Adsorption." Data from pilot tests, as well as experience from existing full-scale plants, utilizing carbon adsorption, are presented and discussed. Procedures for preliminary tests are also discussed, and the characteristics of some full-scale plants, planned or operating, are presented for illustrative purposes. Specific topics covered include: process configurations; process design parameters; equipment design; and the evaluation and selection of carbons for wastewater treatment.

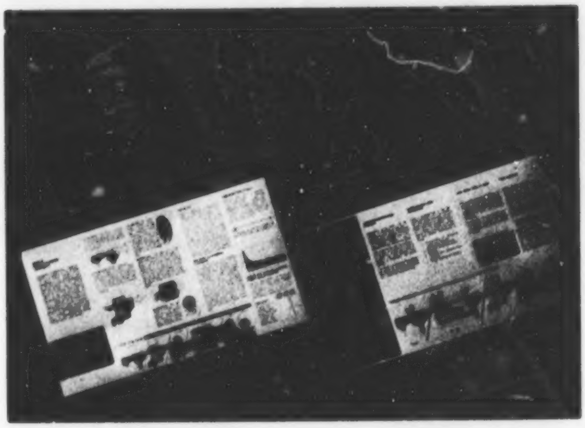


"Process Design Manual for Upgrading Existing Wastewater Treatment Plants. The main purposes of this manual are to examine situations that necessitate upgrading of existing municipal wastewater treatment plants and to discuss and evaluate the corrective actions that are required to upgrade these existing plants. Upgrading to overcome organic and hydraulic overloadings and/or to meet more stringent treatment requirements is considered. The manual emphasizes that operational improvement and modifications to existing unit operations be considered as the initial approach, before major expansion of existing facilities is implemented. One chapter of the manual presents upgrading case histories to illustrate the approaches actually used in these circumstances. The operation and maintenance requirements of the upgraded treatment plants are also briefly examined. The information presented in this manual is specifically adapted to plants having capacities of less than 5 million gallons per day as most of the existing municipal wastewater treatment plants in the United States have capacities less than 5 MGD.

The *"Analytical Quality Control Handbook"* was prepared for Technology Transfer by the EPA Analytical Quality Control Laboratory, NERC, Cincinnati, Ohio, and it contains information on the various techniques and equipment necessary to implement and conduct an efficient quality control program in laboratories. It is addressed to laboratory directors, leaders of field investigations, and other personnel who bear responsibility for water and wastewater data. Subject matter of the handbook is concerned primarily with quality control for chemical and physical tests and measurements. Sufficient information is offered to allow the reader to inaugurate, or to reinforce, a program of analytical quality control which will emphasize early recognition, prevention, and correction of factors leading to breakdown in the validity of data.



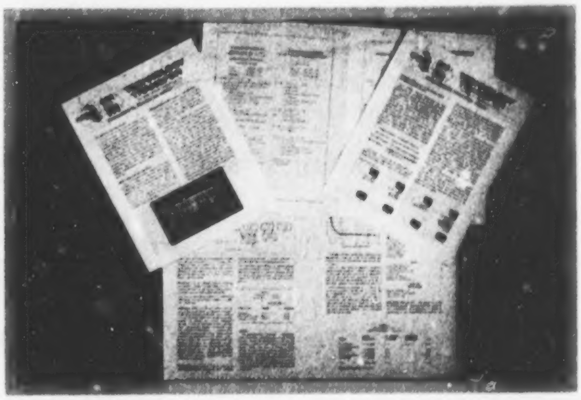
The *"Effluent Monitoring Manual"* was recently prepared by a consulting firm under contract to Technology Transfer. The manual's purpose is to provide industrial managers, chemists, and engineers with a guide to establishing and maintaining a waste monitoring system for their manufacturing facilities. It also provides guidance for municipal facilities handling wastes from industrial sources. The manual serves to bring the user to date on the latest techniques and knowledge of wastewater monitoring in addition to conventional methods now in use.



Work on several other technical publications, including both the industrial and municipal pollution control fields, is currently underway.

Technology Transfer also issues a series of semi-technical publications, including process and project brochures, newsletters, industrial briefing summaries, technical capsule reports, and seminar presentations. The purpose of the brochures is to offer administrative decision-makers, conservation groups, and the general public an insight into the latest pollution control alternatives. The newsletters primary intent is to keep all interested parties informed of the activities of the Technology Transfer Program. In addition, each issue (approximately once each quarter) presents information on successful research and demonstration projects, regional office activities, a brief summary of a new pollution control technology, and other items of a timely interest. The industrial briefing summaries, intended for use by industrial managers, include the basic manufacturing process modifications and treatment processes that may be used to adequately control pollution from a specific industry. The technical capsule reports describe the significance of an industrial pollution control project, explain it with a simplified flowsheet, and give the economics and effluent quality of the process in about six pages. A compilation of technical presentations made at Technology Transfer Seminars has been prepared due to the great demand. These presentations cover such subjects as nitrogen control, phosphorus removal, physical-chemical wastewater treatment, and so forth. Presently available semi-technical brochures include:

Physical-Chemical Treatment
Phosphorus Removal
Upgrading Existing Wastewater Treatment Plants
Seattle, Washington METRO
Wastewater Purification at Lake Tahoe
Indian Creek Reservoir
Carbon Adsorption



Audiovisual material utilized by Technology Transfer includes motion pictures, closed circuit television and graphic presentations. Technology Transfer produces fast-paced, human centered motion pictures depicting successful full-scale application of new technology. Interviews with key individuals involved in the particular projects are included, producing authentic voices of the design engineer, the municipal or industrial decision-maker, the plant operators, etc. It is the purpose of these motion pictures to encourage the use of new technology by showing that it has already been used successfully and is therefore a proven technique.

"somebody
around
here
is
doin'
somethin'

These films are suitable for showing to conservation groups, administrative decision-makers and the general public.

One such motion picture depicts the efforts of the city of Richardson, Texas (suburban Dallas) to improve its treatment plant efficiency. Although the Richardson treatment plant was efficient for the removal of biodegradable organic matter, it did not remove nutrients, such as phosphorus. In 1969, a project was arranged to demonstrate how a conventional treatment plant such as Richardson's could upgrade its performance in a short time and at minimum cost to remove both additional BOD and suspended solids and also nutrients such as phosphorus. This project has proved to be one of the most successful demonstrations of wastewater treatment ever supported by EPA, and the award-winning Technology Transfer film (entitled: "Somebody Around Here Is Doing Something Good") tells the complete story.

Closed circuit television delivers highly technical presentations by well-known professionals in the pollution control field. These presentations are prerecorded video tapes produced by Technology Transfer and give the presentor and listener advantages other media cannot achieve. Small consultation groups can view the tapes and have direct contact with the presentor via telephone at time of showing. Detailed design considerations are discussed and current examples of facilities utilizing the particular technology are viewed. The video tapes can answer current technical questions directly and rapidly by an expert in the field.

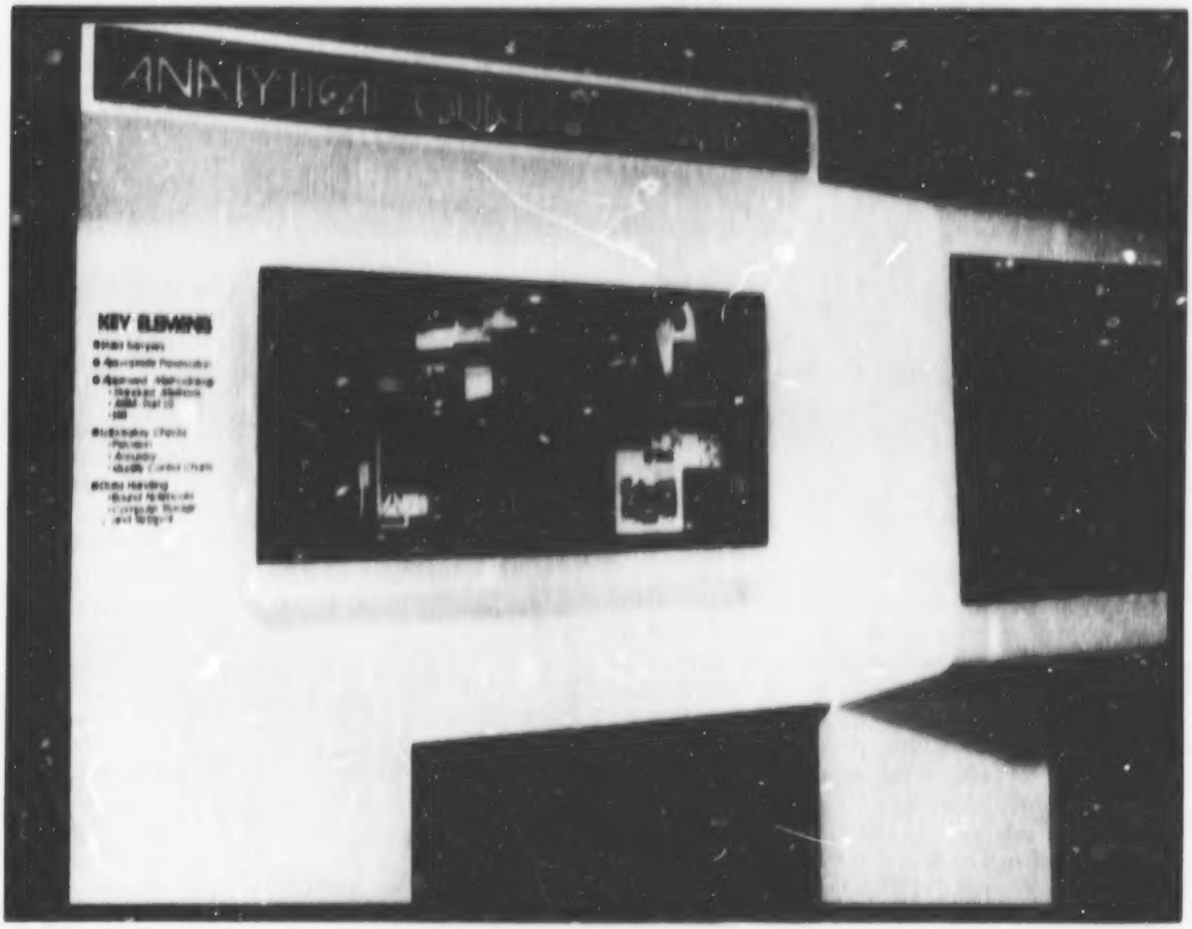
Graphic presentations are put together for use by professionals in the field. Technology Transfer maintains a highly selective color slide library, black and white photo file, and drawings and illustrations relating to new technology.

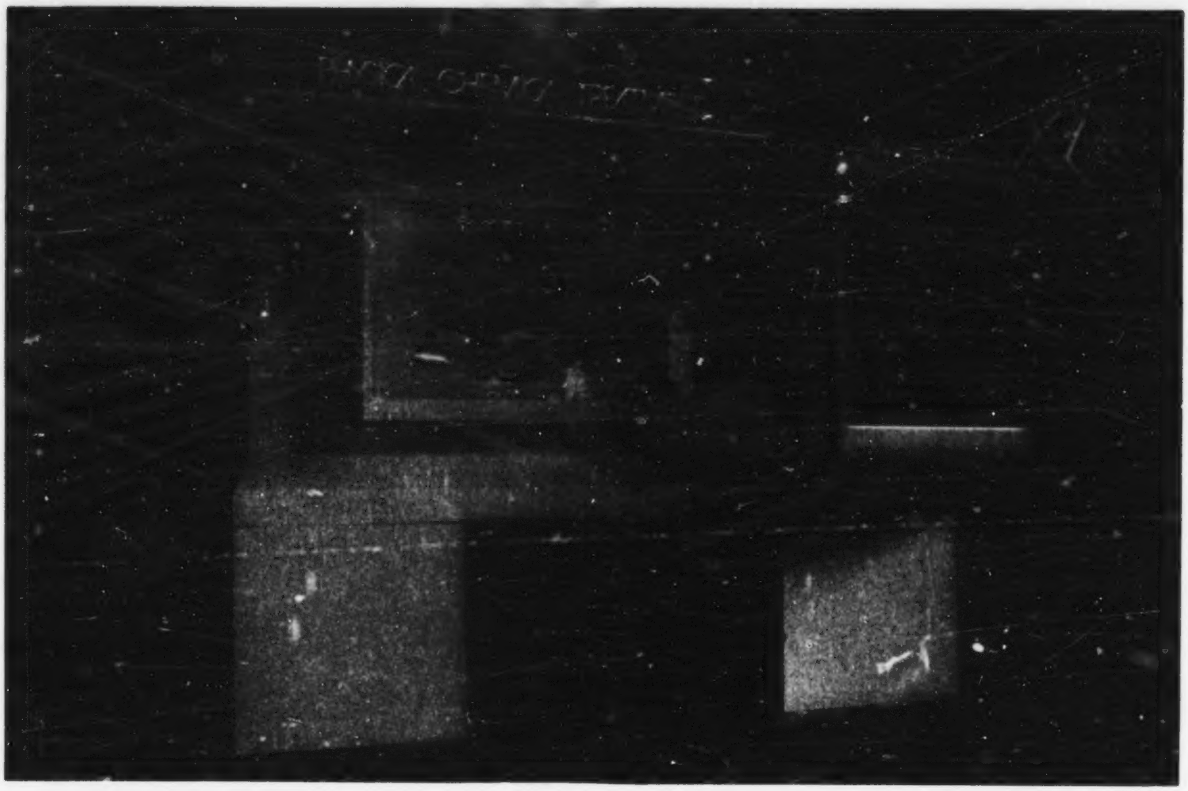
Technology Transfer participates in local and national meetings of professional organizations and conservation groups. In order to effectively present information on various technologies and methods, several *exhibit booths* have been developed and constructed. They cover:

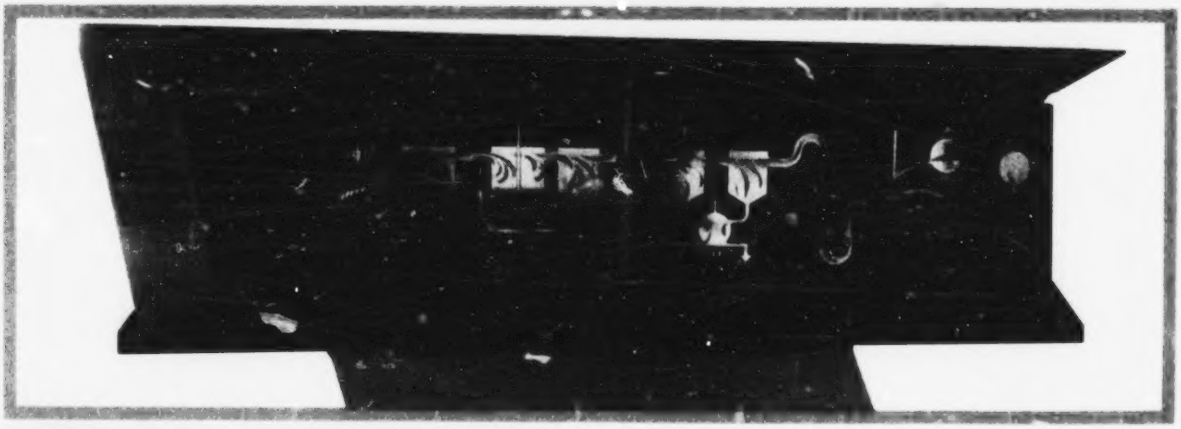
1. Phosphorus Removal
2. Physical-Chemical Treatment
3. Upgrading Treatment Plants
4. Analytical Quality Control

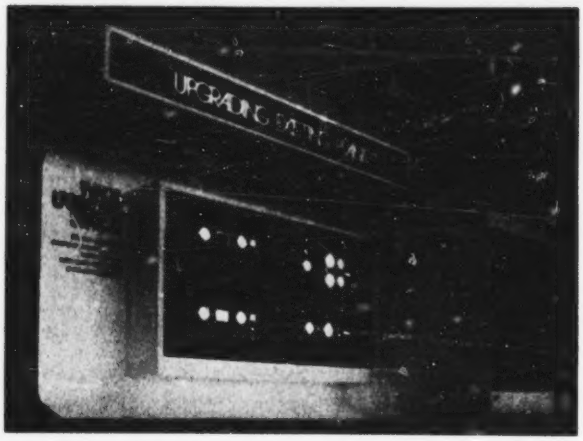
Incorporated in these exhibits are technimated displays and an accompanying visual presentation. The technimated portion of this exhibit depicts how each technology or method functions; the accompanying slide presentation offers details such as cost, past experience, and materials.

Also, Technology Transfer coordinated the development of the entire EPA exhibit for the 1972 Annual Water Pollution Control Federation, in Atlanta, Georgia. These exhibits are available at no charge for use by organizations









where scheduling permits. Some national meetings where one or more exhibits have been utilized are: Annual WPCF Convention; American Industrial Hygiene Conference; ASCE Environmental Meeting; Annual Convention of the Consulting Engineers Council; the 2nd Urban Technology Conference; the Annual Meeting of the American Water Works Association; and the Annual Conference of the International City Management Association.

The Technology Transfer Program maintains a continuous liaison with the key professional organizations in the water pollution control field. These include:

a. Water Pollution Control Federation
b. Consulting Engineers Council
c. American Society of Civil Engineers
d. American Public Works Association

e. Water and Wastewater Equipment Manufacturers Association
f. American Institute of Chemical Engineering
g. Public Technology Incorporated
h. Conference of State Sanitary Engineers
i. Association of State and Interstate Water Pollution Control Administrators
j. Great Lakes and Upper Mississippi Board of State Sanitary Engineers

All Technology Transfer publications can be obtained at no charge by writing to the attention of the Technology Transfer Chairman in the EPA regional office serving you. The Technology Transfer Chairman can also provide information as to the availability of Technology Transfer exhibits, motion pictures, and videotapes.

EPA Regional Offices

Region	Address
I	Environmental Protection Agency John F. Kennedy Federal Bldg, Room 2304 Boston, Mass. 02203
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V	Environmental Protection Agency 1 N. Wacker Drive Chicago, Ill. 60606
VI	Environmental Protection Agency 1600 Patterson Street, Suite 1100 Dallas, Texas 75201
VII	Environmental Protection Agency 1735 Baltimore Street, Room 249 Kansas City, Missouri 64108
VIII	Environmental Protection Agency 1860 Lincoln St., Suite 900 Denver, Colorado 80203
IX	Environmental Protection Agency 100 California Street San Francisco, Calif. 94111
X	Environmental Protection Agency 1200 6th Avenue Seattle, Washington 98101

★ U. S. GOVERNMENT PRINTING OFFICE : 1973 O - 473-856

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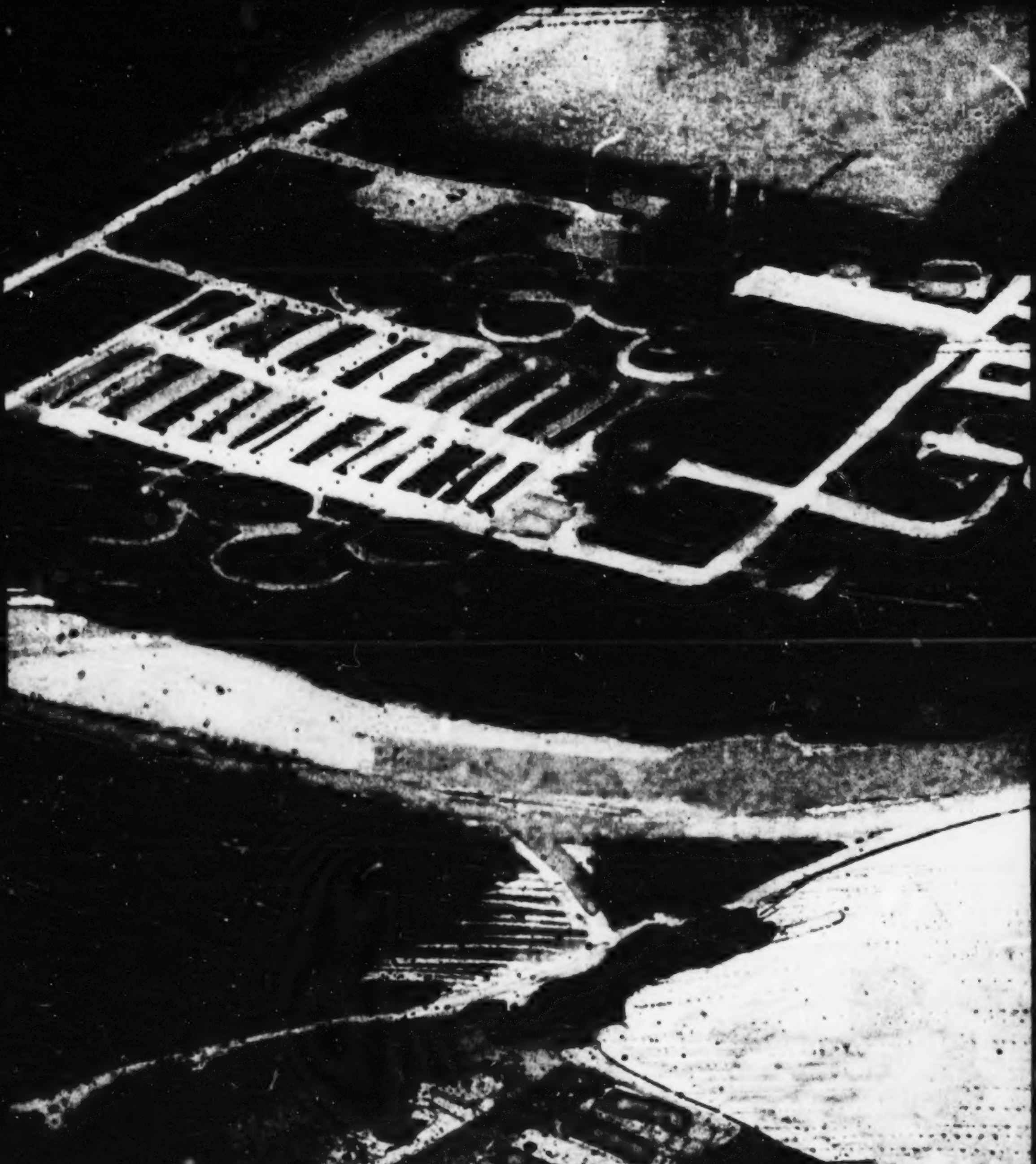
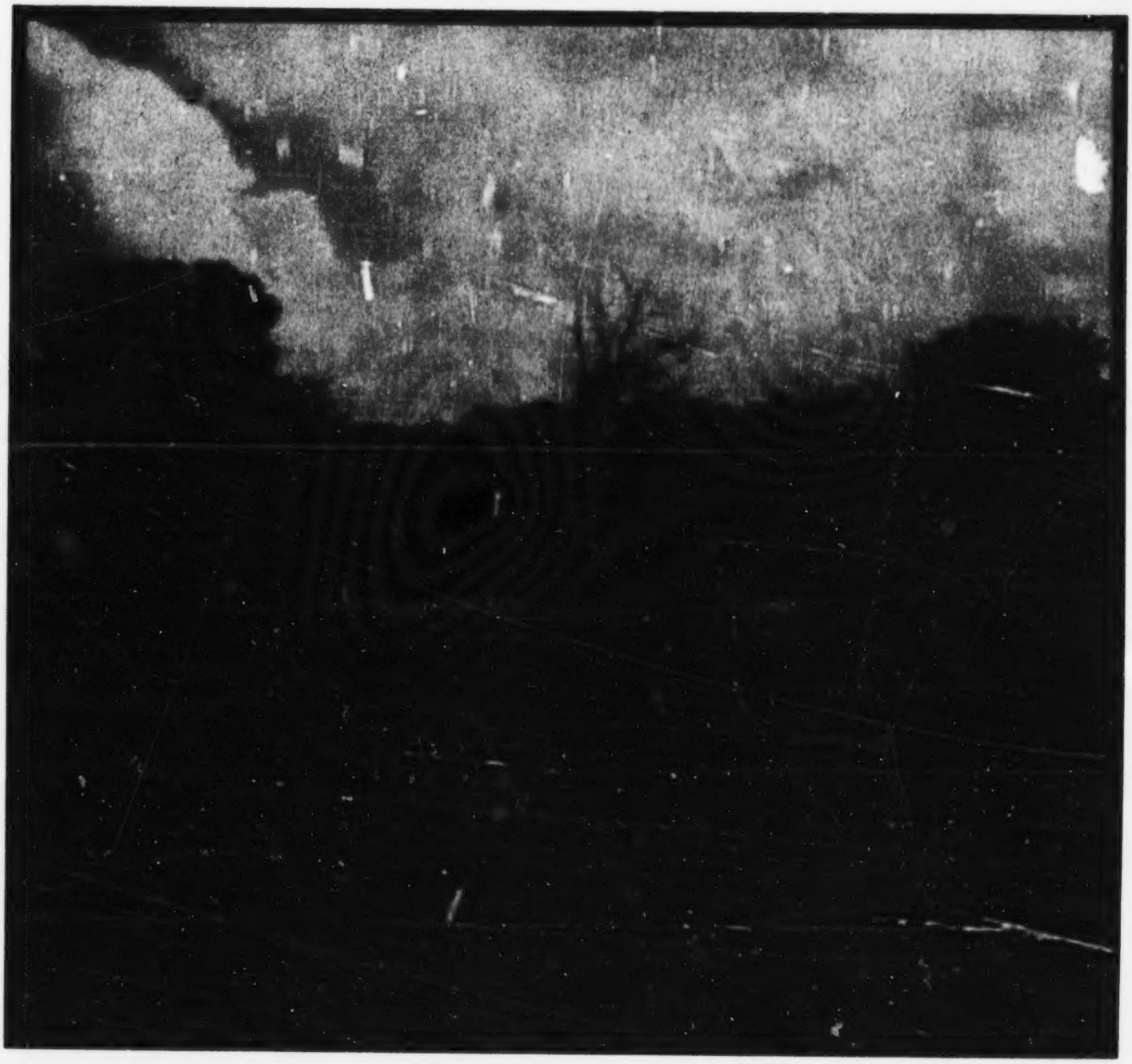


Water Programs

The Office of Water Programs of the U. S. Environmental Protection Agency is responsible for a broad range of water program activities. These activities include program policy development and evaluation, development of water quality and effluent guidelines or requirements, technical direction, support, and evaluation of regional water activities, and development of technical assistance programs. The nationwide implementation of water pollution control programs is carried out through the ten EPA regional offices. The major elements of the Nation's Federal water pollution control effort, as identified above, are carried out through the Office of Water Programs, EPA, Washington, D. C. 20460. The activities of the Office of Water Programs presently include a number of major efforts in a variety of areas of the water pollution control program. These efforts include the following:



Approval Dates For Water Quality Standards Adopted Under The Federal Water Pollution Control Act, As Amended.

STATE	APPROVAL DATE (s)
Alabama*	Feb 1968
Alaska	Feb 1968 Oct 1971
Arizona	Sep 1968 Jan 1969
Arkansas	Aug 1967 Nov 1969
California	Jan 1969 Jan 1972
Colorado	Oct 1968 Oct 1969 Mar 1971
Connecticut	Feb 1968 Apr 1970
Delaware	Mar 1968 Jul 1971
District of Columbia	Apr 1968 Jan 1969
Florida	Jan 1969
Georgia*	Jul 1967
Guam	Jun 1968
Hawaii	Mar 1968 Jun 1971
Idaho	Aug 1967 Feb 1968 Jun 1971
Illinois*	Jan 1968
Indiana	Jul 1967 Jan 1971
Iowa	Jan 1969 Jun 1971
Kansas	Apr 1969 Mar 1971
Kentucky	Mar 1969 Dec 1971
Louisiana*	Feb 1968 Dec 1969
Maine	Jun 1968 Dec 1968 Mar 1971 Jul 1971
Maryland	Aug 1967 Jul 1971
Massachusetts	Aug 1967 Nov 1970
Michigan*	Apr 1968
Minnesota	Jun 1968 Nov 1969
Mississippi*	May 1968
Missouri	Feb 1968 Jun 1968 Jul 1970
Montana	Feb 1968 Jan 1969
Nebraska	Dec 1968 Jun 1971
Nevada	Jun 1968
New Hampshire	Aug 1968 Dec 1970
New Jersey	Mar 1968 Jul 1971
New Mexico	Jul 1968 Nov 1968 Aug 1969
New York	Jul 1967 Aug 1967 Mar 1971 Jul 1971
North Carolina	May 1968 Jan 1971
North Dakota	Aug 1967 May 1970
Ohio*	Mar 1968 Sep 1968 Jan 1969
Oklahoma	Feb 1968 Feb 1970
Oregon	Jul 1967 Sep 1968 Dec 1968 Jan 1970
Pennsylvania	May 1968 Oct 1971 Apr 1972
Puerto Rico	Dec 1968
Rhode Island	Jan 1968 Nov 1968 Jan 1971
South Carolina	Oct 1968 Apr 1969 Dec 1971
South Dakota	Aug 1967 Jun 1971
Tennessee*	Feb 1968
Texas	Jan 1968 May 1969
Utah	Dec 1968
Vermont	Jun 1968 Aug 1971
Virginia	Jan 1969 Feb 1971
Virgin Islands	Feb 1968 Apr 1970
Washington	Jan 1968
West Virginia	May 1968 Jul 1971
Wisconsin	Jan 1968
Wyoming	Nov 1968

*Incompletely approved water quality standards.

THE FEDERAL WATER QUALITY STANDARDS PROGRAM

Under the Water Quality Act of 1965, all the States, territories and other affected jurisdictions were given the option of preparing water quality standards for their interstate streams, lakes, and coastal waters, or of having this done by the Federal Government. All fifty States and four other jurisdictions (the District of Columbia, Guam, Puerto Rico, and the Virgin Islands) drafted their own standards, held public hearings on them, adopted them, and submitted them for Federal approval, as required by law. To date, *all water quality standards have been approved, wholly, or in part.* Notice of approved water quality standards is published in the Code of Federal Regulations at 40 C.F.R. Part 120. The status of State standards approvals is depicted in Table

Water quality standards set our national clean water goals. They include criteria which provide a technical description of water quality that is acceptable and beneficial in each body of water and a plan for implementing and enforcing the criteria. Although applicable only to interstate waters, they may serve as guidelines for setting intrastate water quality standards which the individual States have adopted and applied to waters within their exclusive jurisdiction.

Each State's standards consist of four factors:

1. The *use,* such as for swimming, aquatic life, drinking water, industry, agriculture, or a combination of these, to be made of each particular stretch of a river, lake, or coastal water.

2. *Criteria.* A determination, after public hearings, of the physical, chemical, and biological characteristics which would permit the appropriate uses agreed to by the

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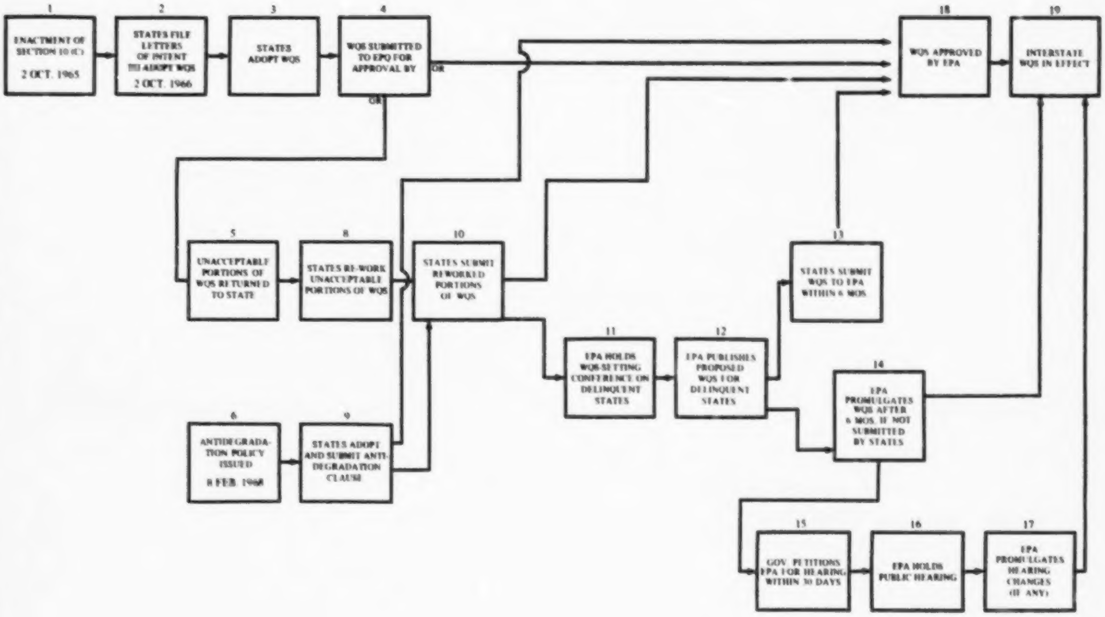
INTERSTATE WATER QUALITY STANDARDS SETTING
Under Section 10 of the Federal Water Pollution Control Act As Amended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ENACTMENT OF SECTION 10 (C)
2 OCT. 1965
2
STATES FILE LETTERS OF INTENT TO ADOPT WQS
2 OCT. 1966
3
STATES ADOPT WQS
4
WQS SUBMITTED TO EPQ FOR APPROVAL BY
OR
OR
5
UNACCEPTABLE PORTIONS OF WQS RETURNED TO STATE
8
STATES RE-WORK UNACCEPTABLE PORTIONS OF WQS
10
STATES SUBMIT REWORKED PORTIONS OF WQS
6
ANTIDEGRADATION POLICY ISSUED
8 FEB. 1968
9
STATES ADOPT AND SUBMIT ANTI-DEGRADATION CLAUSE
11
EPA HOLDS WQS-SETTING CONFERENCE ON DELINQUENT STATES
12
EPA PUBLISHES PROPOSED WQS FOR DELINQUENT STATES
13
STATES SUBMIT WQS TO EPA WITHIN 6 MOS
14
EPA PROMULGATES WQS AFTER 6 MOS. IF NOT SUBMITTED BY STATES
15
GOV. PETITIONS EPA FOR HEARING WITHIN 30 DAYS
16
EPA HOLDS PUBLIC HEARING
17
EPA PROMULGATES HEARING CHANGES (IF ANY)
18
WQS APPROVED BY EPA
19
INTERSTATE WQS IN EFFECT

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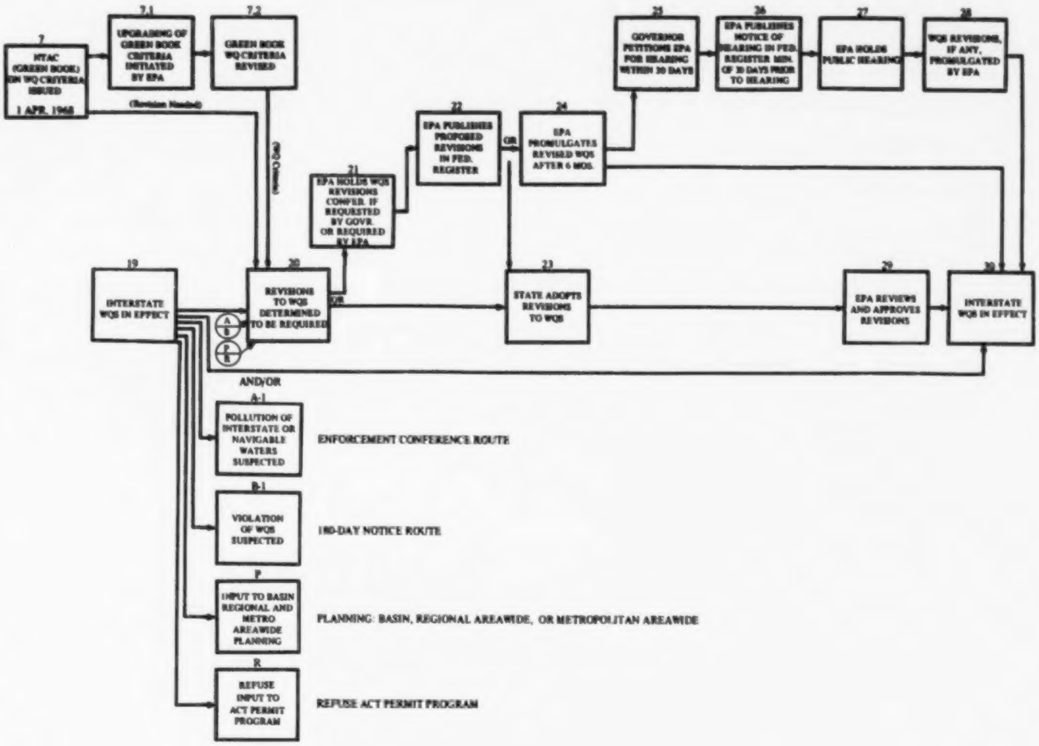
INTERSTATE WATER QUALITY STANDARDS REVISING
Under Section 10 of the Federal Water Pollution Control Act As Amended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NTAC (GREEN BOOK) ON WQ CRITERIA ISSUED
1 APR. 1968
7.1
UPGRADING OF GREEN BOOK CRITERIA INITIATED BY EPA
7.2
GREEN BOOK WQ CRITERIA REVISED
(Revision Needed)
(WQ Criteria)
25
GOVERNOR PETITIONS EPA FOR HEARING WITHIN 30 DAYS
26
EPA PUBLISHES NOTICE OF HEARING IN FED. REGISTER MIN. OF 30 DAYS PRIOR TO HEARING
27
EPA HOLDS PUBLIC HEARING
28
WQS REVISIONS, IF ANY, PROMULGATED BY EPA
22
EPA PUBLISHES PROPOSED REVISIONS IN FED. REGISTER
OR
24
EPA PROMULGATES REVISED WQS AFTER 6 MOS.
21
EPA HOLDS WQS REVISIONS CONFER. IF REQUESTED BY GOVR. OR REQUIRED BY EPA
19
INTERSTATE WQS IN EFFECT
20
REVISIONS TO WQS DETERMINED TO BE REQUIRED
OR
A
B
P
R
23
STATE ADOPTS REVISIONS TO WQS
29
EPA REVIEWS AND APPROVES REVISIONS
30
INTERSTATE WQS IN EFFECT
AND/OR
A-1
POLLUTION OF INTERSTATE OR NAVIGABLE WATERS SUSPECTED
ENFORCEMENT CONFERENCE ROUTE
B-1
VIOLATION OF WQS SUSPECTED
180-DAY NOTICE ROUTE
P
INPUT TO BASIN REGIONAL AND METRO AREAWIDE PLANNING
PLANNING: BASIN, REGIONAL AREAWIDE, OR METROPOLITAN AREAWIDE
R
REFUSE INPUT TO ACT PERMIT PROGRAM
REFUSE ACT PERMIT PROGRAM

State and by the Federal Government. These are written in specific numerical limits wherever possible and set limits on bacteria, dissolved oxygen, temperature, pH, toxic materials, and taste-and-odor-producing substances in the water, among others. Narrative descriptions are employed only if more precise limits cannot be developed.

3. *An implementation and enforcement plan* for construction of waste treatment facilities and the application of other abatement measures by cities and industries to meet the water quality requirements by a certain date. The implementation schedule includes interim dates to measure progress towards plan compliance and a final date for commencement of the planned treatment or control. Pollution originating from vessels and marinas, agricultural wastes, municipalities and industries, dredging, pesticides, acid mine drainage, and other sources is included in varying degrees.

4. *An antidegradation statement* to prohibit the deterioration of waters in which existing quality is higher than the water quality standards set for that particular stream segment or water body. Exceptions to the policy may be allowed on the basis of social and economic necessity, provided the source of degradation will employ the highest and best practicable treatment and will not interfere with beneficial uses designated by the standards or possible in the waters before the new source is added, and provided the State, in approving the new source, obtains EPA concurrence.

Once standards submitted by a State have been approved, they become Federal standards as well, and are therefore subject to Federal enforcement action. However, the initial responsibility for enforcement of standards rests with the States. If a State fails to exercise this responsibility, the EPA Administrator may act. He may act at a

State Governor's request, or independently, and particularly in those cases where interstate pollution affects water quality in two or more States, the public health, or the shellfish industry. If the Administrator is advised that monitoring or other information indicates that the standards are being violated, he is empowered--after public notice and a wait of 180 days--to refer the matter directly to the the Department of Justice for filing of a court suit. If multiple polluters and jurisdictions are involved, the Administrator or the State Governor may call for an Enforcement Conference. Pollution abatement recommendations of the Conference are subject to review by the Administrator. If the recommendations are approved by the Administrator, the polluter(s) may take up to six months to act.

Another enforcement tool is the Refuse Act Permit Program, administered by the U.S. Army Corps of Engineers and based on the River and Harbor Act of 1899. Compliance with water quality standards is considered before granting any permit for discharging industrial waste into streams. Detailed explanation of the permit program is presented in a separate section of this publication.

Once water quality standards have been approved, they are not set in concrete for all time. They can be changed from time to time as appropriate. Either at the request of a State Governor or on his own initiative, the Administrator is empowered to take steps for the revision of standards. States may act to secure the revisions, subject to EPA approval, or the Administrator in the absence of requisite State action may, after notice and a conference, publish proposed revisions and following a wait of six months may promulgate the revised standards. As in the case of a standards setting conference the State Governor has the option of requesting a public hearing. Recommendations for revisions resulting from the hearing are adhered to by both State and Federal authorities. With continued advances in the science and technology of water pollution control, it is expected that many of the approved water quality standards will be improved from time to time in the years ahead in order to meet public demands for cleaner water for necessary and desirable uses. Higher uses require more stringent criteria.

It is national policy to require all interstate waters to be protected for recreational uses and for the well-being and propagation of desirable species of aquatic biota. Minimum recommended criteria to protect those uses are contained in the National Technical Advisory Committee report, "*Water Quality Criteria,*" of April 1968. The NTAC report is used as the basis for judging the acceptability of Federal-State standards. The recommendations of the report are, of course, subject to revision if subsequent evidence indicates the need for re-evaluation of its scientific foundation. Because it is a technical document, the "*Water Quality Criteria*" report is continually being reviewed.

The Office of Water Programs, EPA, is the primary resource for Federal-State water quality standards information. It publishes summary reports of those portions of the individual State standards relating to: acidity/alkalinity (pH), antidegradation, bacterial criteria, disinfection requirements, dissolved oxygen, dissolved solids, general stream use designations, mercury and heavy metals, mixing zones, nitrates, oil, pesticides, phosphates, radiological criteria, secondary treatment requirements, settleable solids, temperature, toxic substances, and turbidity. It also publishes a pamphlet of questions and answers on water quality standards. Copies of these publications may be obtained from the EPA Public Information Officer.

As part of its public information services, the Office of Water Programs provides a microfiche file and reader-printer for anyone who wishes to review any part of the Federal-State standards. All EPA Regional Offices have similar microfiche facilities for water quality standards.

SUMMING UP

To achieve the national goal of clean water - standards:

- Establish specific river basin/estuarine area water quality goals through public review and identification of desired uses.
- Protect these uses by applying established criteria.
- Provide a publicly-visible timetable for corrective actions.
- Provide mechanisms for legal and public opinion pressures on polluters.
- Provide on-going reassessment of public desire for quality water.
- Provide a quantitative framework for technical plans for mid-and long-range pollution abatement and prevention.

INDUSTRIAL WASTEWATER EFFLUENT LIMITATIONS GUIDELINES

The wastewater discharges from the processing of food, textiles, paper and chemical products, petroleum and coal, rubber, primary metals, and machinery and transportation equipment exceed 14 trillion gallons annually. By comparison, the wastewater volume of domestic sewage from the population of the United States served by sewers is slightly more than five trillion gallons.

Of the 14 trillion gallons discharged by industry annually, 4.3 trillion gallons (or 31 percent) are treated prior to discharge. Over one-half of the total wastewater volume is from four major industrial groups and these are primary metals, chemical and allied products, paper and allied products, and petroleum and coal products.

Perhaps more significant than the gross quantity of industrial waste is its concentration of constituents. A few industries such as paper and allied products, the chemical group, petroleum refining, sugar refining, and primary metals, which are typically composed of relatively few, relatively large plants, use most of the Nation's industrial water and therefore produce most of the Nation's industrial wastewater. Because industries tend to be concentrated at points of demand or of raw material availability, and because industrial concentrations create or are attracted to concentrations of population, the environmental effects from such industries are magnified even beyond the level that their gross production of pollutants might suggest. The great preponderance of American industrial water use, as measured by wastewater discharges, occurs in the northeast, north Atlantic, Great Lakes, and Ohio River drainage areas.

Some of the specific pollution problems associated with this country's industrial complex which EPA has taken actions to prevent and control include:

a. Underground, surface and off-shore mining.

b. Acid and alkali mine drainage from underground and surface mines and from strip mines.

c. Oil field wastes from well drilling, brine disposal and oil pipelines.

d. Organic materials that remove dissolved oxygen in decomposition and supply nutrients that stimulate undesirable aquatic growths.

e. Suspend solids that settle to destroy aquatic life and interfere with other water uses.

f. Materials that are toxic to aquatic life or cause harm when present in sublethal concentrations.

g. Materials, including complex organic compounds, that impart an odor to a domestic water supply or to fish or shellfish flesh.

h. In essence, anything that interferes with a designated water use.

Preliminary studies of the effluents from 20 industrial categories have been completed by EPA. These categories included: meat products, dairy products, fruits and vegetables, grain milling, beet sugar, beverages, inorganic chemicals, organic chemicals, plastics and synthetics, petroleum refining, fertilizers, iron and steel, non-ferrous metals, metal fabrication, textiles, flat glass and cement, livestock feedlots, leather tanning and finishing, paper and allied products, and steam generation. Reports of these studies should be available from the Government Printing Office by the end of 1972. An additional result of these investigations is a Summary Report for each industrial category that attempts to define, in four or five pages, the wastewater characteristics of the category as well as the effluent resulting from technology generally available. The quantitative aspects of the effluent are defined in terms of pounds of constituent per unit weight of product produced or material used in the manufacturing process. These Summary Reports are available from the Office of Water Programs.

Plans are underway to continue this series of studies, upgrading findings on such categories as fruits and vegetables, inorganic chemicals, plastics and synthetics, petroleum refining, iron and steel, metal fabrication, textiles, leather tanning, seafood, cane sugar, pesticides, pharmaceuticals, paints, wood products, and rubber processing. The series of reports thus far completed has been described by leading industrial consultants as representing one of the most comprehensive discussions anywhere available on industrial wastewaters and their characteristics.

MINING

Both active and abandoned mines pose problems of water pollution. Acid mine pollution is a well publicized result of mining activity and contributes four million tons of pollutant annually. There are about 12,400 miles of streams that are significantly affected by mine pollution in the United States. Most of these are degraded by coal mining operations, but mining for copper, lead and zinc, uranium, iron, sand and gravel, phosphates, and other minerals are important factors. Stream degradation by mining activities in the Appalachian coal region accounts for 84 percent of the stream miles polluted by mine wastes. Mine pollutants include such dissolved constituents as acid, iron, copper, arsenic, cadmium, nickel, sulfate, phosphate, radioactive minerals, suspended sediments and colloidal iron. EPA's strategy is to provide consultation to correct problems and abate pollution from mining activities, using the results of research and demonstration projects to solve specific field problems.

Prevention of acid and sediment drainage from surface mines can be accomplished through renovation of the mined area. Regrading and revegetation can be very effective means of mine drainage control, and reclaimed mining areas can be used for recreation and other beneficial uses. Other methods of control may involve sealing mines, diversion and/or control of underground drainage and use of chemicals or biological inhibitors to reduce the formation of acid. Neutralization is the most common method of treating acid drainage.

Although many methods have been applied and others are being tested, the problems of mine drainage have been very difficult to deal with, largely because of the costs involved in achieving significant levels of control. Recent cost estimates for pollution control and land reclamation in the mining states total as much as $7 billion. Moreover, the distribution of the mine pollution problem is such that a large percentage of this investment would have to be made in some of the most economically depressed areas in the Nation, involving mines that are no longer operating or producing any revenues.

RURAL WASTES

Rural wastes have played an increasing role in degrading water quality in recent years. This has been due, in part, to large scale highway and housing construction projects and to changes in agricultural practices such as the confining of large numbers of animals into small areas for feeding and fattening operations, and increased irrigation of lands.

EPA has responded to these environmental insults with a rural wastes program. This program's goal is to evaluate the nature and extent of problems associated with distinct types of non-point source pollution, to develop guidelines to control the factors creating the pollution problem, and lastly, to develop a program to implement the guidelines for control. This activity is conducted by the Applied Technology Division, Office of Water Programs. Efforts are directed to control of animal wastes, general land runoff, irrigation return flows, forestry and logging, construction site siltation, and rural sanitation.

Following an assessment of the problem, the development of control guidelines and implementation of a program to ensure the nationwide use of these guidelines is necessary. EPA has just begun the substantial task of controlling pollution from non-point source wastes. We have completed and published one report, *"Control of Erosion and Sediment Deposition from Construction of Highways and Land Development,"* and we have completed and made available for distribution a summary report of a comprehensive study of the confined livestock feeding industry. These reports are currently available from the Applied Technology Division, Office of Water Programs. Additional reports that will address irrigation return flows, logging and forestry, animal feedlot wastes and dairy wastes will be completed. Already submitted to the Government Printing Office for publication is a comprehensive report on the confined livestock feeding industry that defines the wastewater characteristics of this industry and the available technology for control of pollution.

EPA has adopted a policy on control of nutrient runoff from agricultural lands. This policy is aimed at limiting erosion and sediment runoff, requiring application of fertilizers under proper climatic and crop-growth conditions, and the retention of animal wastes on the land. Key features of the policy are:

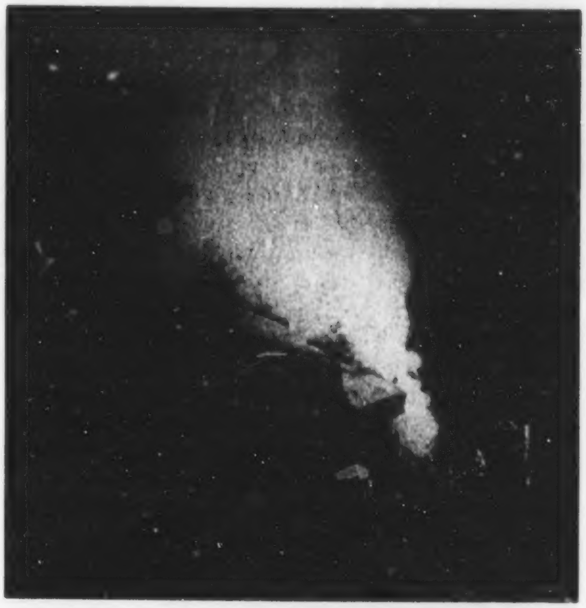
a. That watering and feeding points for confined animals should be established away from waterways.

b. That when a high density of animals is created through confinement, fencing of streams which cross such areas should be used as a means of water pollution prevention.

c. That stream beds and banks may be destroyed by animal hoofs and contribute to siltation; such destruction can be prevented by fencing animals away from the streams.

EPA's Office of Intergovernmental Programs has been working with the Council of State Governments in the pollution control. One such law has been termed the "Model State Confined Feeding Environmental Control Act." Another was "Sediment Control." Yet another was addressed to the control of toxic materials. The adoption by the individual States of a law that would ensure control of confined animal feeding areas and sediment control would be a giant step in the direction of water pollution abatement. Under existing laws the individual States have principal jurisdiction over the control of rural wastes. The role of the Federal Government is principally one of technical assistance in problem solving and the supporting of research and demonstrations with grant or contract monies.

Technical assistance is available in the Office of Water Programs and in comparable support groups in the EPA Regional Offices. The objective of this program is to assist Federal, State, interstate, or local authorities in the control or prevention of water pollution through application of existing technology beyond the limitations of their own resources. Upon the request of any State water pollution control agency, EPA may conduct investigations and research and make surveys concerning any specific problem of water pollution and recommend solutions.



OIL AND HAZARDOUS MATERIALS

Approximately 15,000 spills of oil and/or hazardous materials occur annually in U.S. navigable waters. Presently, 75 percent of these spills involve petroleum products. The potential for oil spillage is expected to triple over the next 30 years. This increased potential for spillage is related to the projected increased demand for petroleum products during this period. This will be accompanied by a 73 percent increase in transport and use of hazardous materials that is expected by 1980.

The major effects of spills of oil and hazardous materials are injury or death to aquatic life, including waterfowl, as well as aesthetic and economic damage to beaches, boats and shoreline property. Essentially, all navigable and coastal waters in this country are vulnerable to oil spills because of the wide dispersion of oil and petroleum product transport, storage, refining and use. Many of the non-navigable surface waters and ground waters are also subject to oil spill damage because of pipeline breaks, tank truck accidents, the rupture or leakage from gasoline stations and other small tank storage facilities and the deliberate dumping of waste oil.

The Division of Oil and Hazardous Materials, Office of Water Programs, is assigned the job of gaining compliance with water quality standards through the elimination of spills of oil and hazardous materials. Secondary goals are to minimize the continuous discharge of oil and hazardous materials from vessels, offshore and onshore facilities, and to reduce the impact on the aquatic environment of catastrophic spills which will inevitably occur. The methods employed to achieve these objectives are:

a. Implement a comprehensive prevention program that will eliminate spills at the source and minimize the effects of those spills caused by unavoidable accidents;
b. Provide a fully adequate Federal response to carry out the cleanup of spills when the responsible party fails to act;
c. Establish effective regulations for the prevention, control and cleanup of oil and hazardous materials discharges, determine compliance with the regulations, and refer violations to enforcement programs for legal action.
d. Coordinate technology needs with research and development and apply research findings to problem solutions;
e. Assist Federal, State and local agencies in developing contingency plans, response capabilities and prevention programs.

EPA is encouraging and assisting the development of technology to (a) detect illegal discharges of oil; (b) designate control and cleanup methods to be used by the responsible parties in handling oil spills; (c) designate methods, procedures and equipment for prevention of oil discharges (d) designate harmful hazardous substances discharges and recommend methods for the control and cleanup of hazardous substances spills.

The Federal Government's strategy is to transfer the burden and responsibility for spill pollution control to the discharger and to relieve the Federal, State and local governments of the need to mount massive efforts to control and cleanup such spills. In those situations where statutory authority or technology are inadequate, guidelines are prepared to help suggest interim measures to prevent and control discharges of oil and hazardous materials. Specific guidelines to be prepared, for example, include prevention requirements for oil and hazardous materials which will be applicable to the special provisions of the Refuse Act Program. Guidelines on environmental priorities and assessment of total cleanup of harmful quantities of oil and hazardous materials will be developed, utilizing current technology. The guidelines will be continually updated and revised during the next five years to reflect new technology and legislation.

The cumulative effect of the thousands of small spills which occur throughout the nation will ultimately have a far greater impact on the total environment than the occasional major spill. Primary program emphasis, therefore, is placed on effective prevention of spills of oil and hazardous substances and reduction of continuous discharges of these materials. Areas which receive emphasis are onshore and offshore non-transportation related facilities, post spill inspections to determine compliance with the regulations and the prevention schedules required under the Refuse Act Permit Program and review of offshore facilities to ensure compliance with regulations for the control of continuous discharges.

Industry is being encouraged to preplan to prevent spills of oil and hazardous materials. "Fail-safe" design requirements are essential to the development of an effective program. Therefore, special reliability and fail-safe analysis studies are being undertaken for facilities handling, storing, manufacturing, and transporting oil and hazardous materials. Findings from these studies will be used to prepare guidelines, regulations manuals and model codes for a spill prevention, control and countermeasure program. Another aid in preplanning for spill prevention will be a national assessment of high spill potential sources. Considerable emphasis will also be placed upon operational discharges resulting from oil and chemical tanker operations, recycling of waste oil and ocean dumping.

Although spill prevention is the key goal, capabilities for spill response and contingency planning must also be developed. Despite exercise of the most effective precautions to prevent spills, they will continue to occur. To mitigate the damage resulting from such spills of oil and hazardous materials, contingency plans for immediate response have been developed at the Federal level, and State and local groups at the regional level are being encouraged to develop their own. In support of the contingency plans, mobile spill response teams composed of specially trained people must be established at the local regional and national levels to coordinate activities among agencies at these three levels. Team expertise is required in sanitary engineering, biology, chemistry, hydrology, and oceanography. Regional teams will also determine compliance with cleanup regulation, and gather documentary evidence for use in enforcement actions, and conduct damage assessment survey.

To carry out these activities, the *National Oil and Hazardous Materials Pollution Contingency Plan* includes procedures dealing with Federal responsibility, cleanup techniques, damage assessment, safety, monitoring, compliance and use of Federal funds. In accordance with this Plan, EPA maintains the lead role in providing advice on environmental priorities, cleanup techniques, and serves as on-scene coordinator for inland spill incidents.

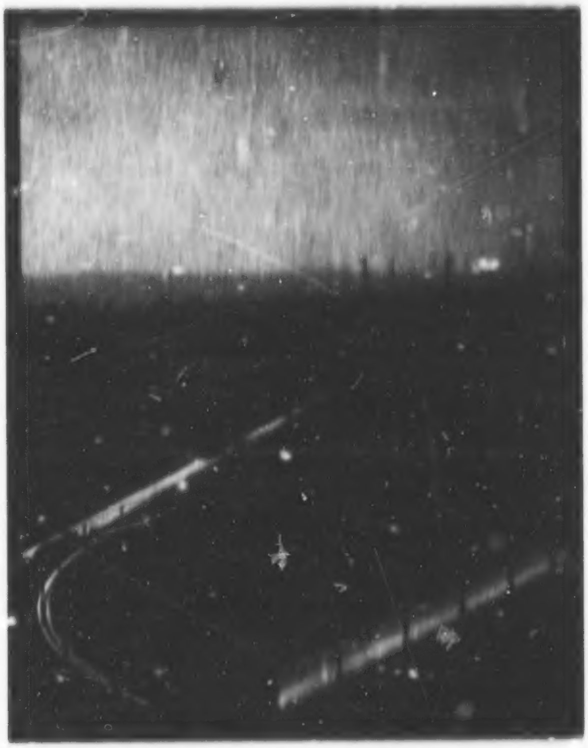
Because current cleanup technology is rather poor (actual oil recovered from the aquatic environment has been less than 20 percent of the total spilled, hazardous materials considerably less) great emphasis is placed on research and development and technology transfer to demonstrate new removal techniques. An active restoration program is also being developed because, even with improved cleanup technology, considerable restoration will still be necessary to place the environment in its prespill condition.

Surveillance and monitoring are necessary support functions for effective spill response, prevention and enforcement programs, with responsibility for inland waters being delegated to EPA. Methods include flights over high risk areas and on-site monitors.

SUMMING UP

Through the efforts of the national and regional programs of the Environmental Protection Agency and the U.S. Coast Guard, actions are taken to clean up the majority of all reported oil spills. Over 90 percent of all significant oil spills into navigable waters are being reported to the U.S. Coast Guard or EPA, permitting rapid response actions. A significant number of hazardous materials spills are also being reported.

Oil cleanup cooperatives and oil removal contractors have become operational at all major U.S. ports. Some improvements have been noted in the design and operation of offshore oil production facilities and in vessel operations to minimize oil discharges. It is hoped that this trend of public and private consciousness of the problems posed by oil and hazardous materials pollution will continue to expand.



DESIGN, CONSTRUCTION AND OPERATION OF MUNICIPAL WASTEWATER TREATMENT SYSTEMS

The basic mission of the EPA municipal wastewater treatment works construction program is to provide financial assistance to local governments in the construction of new, improved, and expanded wastewater treatment facilities. As part of this mission, the program must also ensure the effective design, adequate construction, and efficient operation and maintenance of these facilities. This is accomplished through national uniformity in the application of legislation and regulations, and interagency coordination with other departments of the Executive Branch of the Federal Government having similar programs, such as the Department of Housing and Urban Development, the Economic Development Administration in the Department of Commerce, Farmer's Home Administration in the Department of Agriculture, and the Appalachian Regional Commission.

In implementing the objectives of this program, Headquarters serves as the focal point for resolving national issues concerning the construction of wastewater treatment facilities. Such issues include not only the determination of eligibility of projects for grants, but also general guidance to the Regions for interpretation of the Federal Water Pollution Control Act and the regulations to implement the Act. However, the implementation of the program and the day-to-day project operations are through the Agency's Regional Offices working jointly with the State water pollution control agencies.

With the rapidly increasing expenditures of public funds for municipal wastewater treatment, every effort must be made to ensure that the best available technology is utilized, that designs are cost-effective, and that facilities can be adequately operated and maintained. To achieve these goals there must be close coordination and cooperation between the local communities, consulting engineers, state and the Environmental Protection Agency. For this reason, the Federal responsibility for the engineering and design aspects of specific municipal wastewater projects is decentralized in each of the ten EPA Regional Offices under the Director of the Air and Water Programs Division. A counterpart staff under the Director of the Division of Municipal Wastewater Programs is located at EPA Headquarters in Washington, D.C. The Headquarters staff is responsible for establishing national engineering and design policy and preparing Guidelines and Technical Bulletins for use by grant applicants, state agencies and EPA Retional Offices in the preparation and technical review and approval of treatment works plans and specifications.

Guidelines outline, in general terms, EPA interests and policies with regard to treatment works design, operation and maintenance. Technical Bulletins are issued to amplify, in detail, certain subject areas contained in the Guidelines. The EPA approach to development of these documents involves extensive participation by all concerned with the mission of water pollution control and environmental protection. The basic work in background studies and development of the Technical Bulletins is being accomplished primarily by engineering firms with experience in the design, construction and operation of wastewater treatment facilities. In a few cases, these materials have been developed by firms having expertise in related fields in order to benefit from their experiences.

A Technical Advisory Group (TAG) has been established to provide technical review and recommendations to the Division of Municipal Wastewater Programs. The TAG is composed of experts in the areas of wastewater treatment systems design, construction and financing.

Membership of the group presently consists of representatives from each of several organizations interested in wastewater treatment systems design, construction, and financing. Current membership of the TAG includes representatives of the following organizations:

American Society of Civil Engineers
Water Pollution Control Federation
Association of Metropolitan Sewerage Agencies
National League of Cities/ U.S. Conference of Mayors
Association of State and Interstate Water Pollution Control Administrators
Associated General Contractors of America
Water & Wastewater Equipment Manufacturers Assoc.
Securities Industry Association
Conference of State Sanitary Engineers
American Public Works Association
Consulting Engineers Council of the United States

To date, the EPA has published two guideline documents: *"Federal Guidelines for Design, Operation and Maintenance of Wastewater Treatment Facilities," and "Federal Guidelines for Equitable Recovery of Industrial Waste Treatment Costs in Municipal Systems."* These Guidelines will be updated periodically to incorporate reference to the Technical Bulletins, specific information from EPA process design manuals, new or revised Agency policy, and new legislative action. Three Technical Bulletins were recently issued covering "Storage and Handling Facilities for Chemicals Utilized in Wastewater Treatment," "Use of Mercury in Wastewater Treatment Plant Equipment," and "Use of New and Advanced Wastewater Treatment Technology." Copies of these publications are available from each of the Regional Offices through the Director, Air and Water Programs Division. Guidelines and Technical Bulletins covering a number of other subject areas are presently under preparation.

The review and approval of specific projects for eligibility of Federal financial assistance has been delegated to the EPA Regional Offices. Regional Administrators have the authority to waive provisions of the Design, Operation, and Maintenance Guidelines and Technical Bulletins on a case-by-case basis when adequate justification is given. When requested by the Regional Offices, the EPA Headquarters engineering and design and operation and maintenance staff will provide technical assistance on specific projects. For States which do not have adequate staffing, EPA review of projects is much more comprehensive than for States with adequate programs.

A new procedure for preapplication and predesign review for waste treatment works construction projects was established in December 1971. This recognizes the necessity for close EPA/State/applicant cooperation and coordination on projects at an early stage before detailed design is initiated. The procedure involves a preliminary review meeting at the early planning stages of a project to advise the applicant of the requirements for projects to qualify for Federal financial assistance. Following this meeting, the applicant is required to submit an engineering report through the State agency for Regional Office technical review. On major projects, predesign conferences will be held with the applicant, consulting engineer and State agencies to discuss and review basic planning, applicable water quality standards, technology and treatment requirements, environmental impacts, cost effectiveness, and other aspects

Federal Regulations published on July 2, 1970, covering operation and maintenance of wastewater treatment plants receiving Federal financial assistance provide for:

- Recovery from industry of its proportionate share of the municipality's capital costs.
- Pretreatment of industrial wastes that would be detrimental to municipal treatment system.
- Adequate industrial user charge system for recovery of operation and maintenance costs incurred by the municipality treating the waste flows from industry.

EPA's *"Federal Guidelines for Design, Operation and Maintenance of Waste Treatment Facilities"* facilitates compliance with these regulations. The Guidelines reflect the necessity for deriving the maximum benefit from expenditures for pollution control, and represent a concerted effort to ensure that newly constructed systems are properly designed and operated. In addition to fostering cost-effectiveness, specific objectives include provision of adequate and trained staff for efficient plant operations. EPA has developed manpower training programs to assist the municipalities and States in meeting staffing needs and encouraging mandatory certification of operators by the States.

Municipalities and governmental agencies receiving a construction grant under the Federal Water Pollution Control Act are required to provide satisfactory assurances that the project funded will result in an operable treatment works. In addition, the facilities must be operated and maintained in an efficient, effective and economical manner. These requirements are prescribed as conditions to the EPA grant offer and acceptance by the grantee.

Information on various aspects of the EPA Operation and Maintenance Program is available in program documents listed below. Copies of these documents may be obtained from EPA regional offices.

SUBJECT	INFORMATION SOURCE
Suggested Outline for Treatment Plant Operation and Maintenance Manual	*Federal Guidelines, Design, Operation and Maintenance of Wastewater Treatment Facilities.
Emergency Operating Plan	(Emergency Operating Plant manual is under development)
Treatment Plant Staffing	Federal Guidelines, Design, Operation and Maintenance of Wastewater Treatment Facilities.

SUBJECT	INFORMATION SOURCE
	(Treatment Plant Staffing guidelines are under development)
Laboratory Facilities and Testing	(Guidelines under development)
Treatment Plant "Start-Up"	Federal Guidelines, Design, Operation and Maintenance of Wastewater Treatment Facilities Treatment Plant "Start-Up manual is under development
Treatment Plant Records, Reports and Laboratory Control	Federal Guidelines, Design, Operation and Maintenance of Wastewater Treatment Facilities (Treatment Plant Records, Reports, and Laboratory Control manual is under development)
Treatment Plant Process Control Operational Flexibility Bypassing Plant Monitoring of Wastewater Characteristics Maintenance Program	Federal Guidelines, Design, Operation and Maintenance of Wastewater Treatment Facilities
Storage and Handling of Chemicals in the Treatment Plant	Technical Bulletin No. D-71-1 Supplement to Federal Guidelines, Design, Operation and Maintenance of Wastewater Treatment Facilities
Regulatory Agency Inspections: Federal Regulations	18 CFR 601.35
Federal and State Inspection	Federal Guidelines, Design, Operation and Maintenance of Municipal Wastewater Treatment Facilities
Inspection Guidelines	Procedures for Evaluating Performance of Wastewater Treatment Plants

Under the Federal Water Pollution Control Act, as amended, the Environmental Protection Agency may make grants to any State, municipality and intermunicipal or interstate agency for the construction of necessary treatment works to prevent the discharge of untreated or inadequately treated wastewater effluent. The grants also cover reports, plans, and specifications in connection with such construction. The term "treatment works" means the various devices used in the treatment of municipal or industrial wastes of a liquid nature, including the necessary intercepting sewers, outfall sewers, pumping, power, and other equipment and their appurtenances and includes any extensions, improvements, remodeling, additions and alterations thereof.

Any municipality which has authority to construct, maintain, and operate a wastewater treatment works may be eligible. A municipality is any city, town, borough, county, parish, district, or other public body created by or pursuant to State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, and an Indian tribe or authorized Indian tribal organization.

Construction costs eligible for Federal grants include:

- Those incurred in building new sewage treatment works or extensions, alterations, acquisitions, improvements or remodeling of existing treatment works.
- Those for necessary intercepting sewers, outfall sewers, pumping, power, and other equipment or facilities.
- Those for preliminary planning and such other actions as engineering, legal and fiscal investigations, studies, and designs, including the supervision and inspection of construction.

Principal ineligible costs include:

- The cost of the site or land on which the sewage treatment works is to be built.
- The costs for wastewater collection systems or any part thereof, (intercepting and outfall sewers are not considered to be part of the collection system.)
- The cost of any work not included in the project as approved by the Environmental Protection Agency.

Guidance of State water pollution control agencies should be first sought on the filing of grant applications and the availability of funds. Before Federal funds are committed, two fundamental requirements must be met. These are:

- The project must be approved and certified by the State agency.
- The project must conform with the approved water quality management plan for the area.

Under certain conditions, financial assistance for the construction of waste treatment and collection systems is available from other Federal agencies under other Federal statutes, including:

- The Appalachian Regional Development Act of 1965 (Public Law 89-4) which permits the U.S. Department of Commerce to increase contributions from other Federal programs in Appalachia up to 80 percent of project costs.
- The Housing and Urban Development Act of 1965 (Public Law 89-117) which permits the U.S. Department of Housing and Urban Development to make grants and loans for basic water and sewer facilities.
- The Public Works and Economic Development Act of

1965 (Public Law 89-136) which authorizes the U.S. Department of Commerce to make grants and loans for public works in economically distressed areas.

1965 Amendments to the Consolidated Farmers Home Administration Act of 1961 (Public Law 89-240) which authorizes the U.S. Department of Agriculture to make grants and loans for water supply, waste treatment and disposal facilities.

PROCEDURE FOR ACQUIRING AN EPA CONSTRUCTION GRANT

Evaluation of the Problem. The decision that wastewater treatment facilities are needed is usually prompted by citizen complaints on malfunctional septic tanks, inadequate capacities of sewers, resulting in spill-overs into streets and notification by the State that corrective measures to prevent pollution must be initiated.

Selecting a Consulting Engineer. Most small communities are void of technical capabilities and must rely on consulting services for evaluation, preparation of feasibility studies and applications, and subsequent construction supervision. The following should be considered in the selection of a consulting engineer.

a. Has the consultant performed similar services in the area? Check with officials in municipalities which have contracted the engineer on the engineer's performance. If you must learn by experience, let it be someone else's experience.

b. The size and capabilities of the firm. The firm must have sufficient capacity for data preparation, inspection, etc., to comply with the necessary planning and construction time period.

c. Financial status. Does the firm have sufficient resources to continue operation under your payment schedules.

Evaluation of Feasibility Reports.

a. Consider all alternatives not only on initial cost but on overall operation costs and results obtained.

b. Financial Requirements. How will the municipality's share be financed? Very few municipalities have the capacity to finance their portion with general obligation bonds to finance the project. This results in less control of operation by the governing body but does provide a more stable operation. If an election is required to sell bonds, it is advantageous at this time to poll public opinion on the issue. The citizenry should be kept informed of the problem and what action is being taken. By doing so, a possibility of future confrontation over financial or environmental issues may be avoided.

c. After selecting the most feasible solution to the problem, send copies of the feasibility study to local and State planning agencies for their concurrence. Prior to submittal to the planning agencies, remove all data pertaining to alternate methods and financing. The purpose of the submittal to planning agencies is to ascertain that the facility is compatible with their area development and basin plans. The alternate methods and financing should be of no concern to the planning agencies and would only delay their concurrence.

Application.

a. Prior to preparation of the application, submit to the appropriate Regional Office of EPA two copies of the feasibility report and two layouts of site plans showing the proposed facilities and request a preliminary determination of eligibility. EPA will then advise the applicant as to what portions of the facility may be considered eligible for Federal participation under P.L. 660.

b. Upon receiving the preliminary determination of eligibility, prepare the application for construction grant and submit to appropriate State office. Be sure to answer all questions. If question is not applicable, so state on application. The State agency should be contacted prior to submittal to ensure that proper channels will be used and State requirements will be fulfilled.

Be sure to include with the application the following:

1. Concurrence statements from planning agencies.
2. Certification from City attorney that the construction site has been acquired or that the municipality has the power of condemnation.
3. Engineering report on design of facilities.
4. Copy of resolution delegating official to sign application.
5. Certification of availability of local funds or source of financing.
6. Engineering contract.
7. Proposed operation and maintenance budget and staffing.
8. Form T-128 – OEO certification.
9. Final plans and specifications if required by the State.

c. After receipt and review of the application, the project is assigned priority status for certification by the State agency. If plans and specifications were not required with the application, they should be submitted to the State a minimum of six months prior to the fiscal year on project priority listing. After certification by the State the applicaton is forwarded to the EPA Regional Office.

Grant Offer.

a. After processing and approval of application by the EPA Regional Office, the applicant will receive a notification of grant offer contingent on approval of plans and specifications. The portion of this form designated as "Acceptance of Grant Offer" should be completed and returned as soon as possible. This offer is contingent on approval of plans and specifications so *do not* advertise for bidders or start construction.

b. With the notification of approval of plans and specifications, the applicant receives "Part B" of the application for grant offer. The applicant now advertises for bids and receives bids but *does not* award contract. The "Part B" document is completed and forwarded along with supporting documents to the EPA Regional Office. The following supporting documents must be included:

1. Bid tabulation.
2. Copy of low bidder's proposal.
3. Justification if other than low bid is selected.
4. Equal opportunity, civil rights, and labor standards

compliance forms signed by low bidder.

5. Proof of advertisement.

Upon approval of "Part B" the applicant is notified to award contract and start construction.

Construction.

a. A separate account must be maintained for all project expenditures. Keep documentation on all expenditures in the account.

b. Requests for payment should be prepared by the engineer, signed by the applicant and forwarded through the State to EPA as soon as possible after completion of work intervals as stated in the Grant Agreement.

c. All construction modifications must be by change order approved by EPA.

d. Upon completion of construction and payment of all bills, notify EPA and request a final inspection.

FEDERAL AGENCY COMPLIANCE WITH WATER POLLUTION CONTROL REQUIREMENTS

As the Nation's largest single real estate owner, builder, employer, and purchaser of goods and services, the Federal government has a potentially significant impact upon the environment and particularly upon its water resources. Federal agencies are required by the Federal Water Pollution Control Act to "ensure compliance with the applicable water quality standards" in the administration of their property, facilities and activities. Presidents Truman, Eisenhower, Johnson and Nixon each have issued Executive Orders to the heads of Federal agencies on the prevention, control and abatement of pollution by Federal activities. In February 1970, President Nixon issued Executive Order 11507 requiring that agencies have completed or underway by December 31, 1972, all actions necessary to bring existing installations into compliance with water quality standards.

After the expenditure of more than one-half billion dollars for water pollution control in the last six years, Federal agencies expect to meet the cleanup deadline with few exceptions. Funds have been requested within each agency for the remaining reported projects. Increasingly stringent water quality standards, obsolescence, and in some cases, newly overburdened facilities will require advance planning, budgeting and appropriation of new funds this year and every year hence in order to ensure compliance with Federal, State, regional and local water polution control requirements.

In addition to the sources of pollution at Federal installations, agencies are required to prevent pollution resulting from activities by individuals and organizations sanctioned by Federal license or permit. Each license and permit application must include a certification from the State, in which the activity will take place, that there will be no violation of water quality standards by the applicant. EPA provides technical advice and assistance to the Federal agencies in meeting their pollution control obligations, and in collaborating with State water pollution control agencies in establishing standards.

The National Environmental Policy Act of 1969, particularly Section 102 (c), requires Federal agencies to evaluate environmental damage in addition to other costs such as construction of facilities, developing basin plans, etc. – in any action significantly impacting the environment. The Office of Federal Activities sets policy and coordinates the review and development of environmental impact statements. The Office of Water Programs provides technical assistance to OFA to ensure that water quality standards are met and land-water use considerations are adequate. From the work on impact statements, it is clear that three major problem areas exist and OWP is participating in the development of procedures to help resolve problem areas such as:

1. *Site Selection.* Unless environmental assessments are made early in the planning process and incorporated into all phases of basin or project plans, it is often too late to redress serious impacts to the environment that could have been avoided by better planning.

2. *Planning Feedback.* Impacts of projects must be evaluated and the updated assessments fed back into the initial aspects of future environmental planning. One way in which this can be accomplished is by on-site evaluation teams during construction and operation of major projects. The environmental results of these projects, both good and bad, provide the basis for better planning.

3. *Environmentally-Protective Guidelines.* Better guidelines are needed to aid in the development of plans and of the construction and operation of projects, etc. For example, the impact of erosion on water quality is such an important aspect of many kinds of projects – channelization, dredging, dam construction, laying of pipelines, etc. – that better guidance must be made available on the control of erosion under a multitude of conditions.

MANPOWER DEVELOPMENT AND TRAINING

The size and complexity of the water pollution control manpower universe is defined by a number of factors:

a. The current large number of jobs (1971 estimate: 149,400).

b. The projected rapid growth in jobs (1976 estimate: 254,200).

c. The large number of employers (1971 estimate: 25,000 public and private).

d. The geographic dispersion of jobs throughout the Nation.

e. The large number of different occupational categories (EPA had identified 144 different occupations).

f. The changing technology that affects the nature of the work performed by many employees.

In light of these factors, EPA is developing a manpower planning program to meet the goals of the overall manpower development system. The program has two primary components: (1) Forecasting and (2) Action Planning.

The forecasting component is used to estimate the supply and demand for personnel and the need for additional training. The action planning component identifies opportunities or programs that may be of benefit when it is determined that the supply of personnel or training will be insufficient to meet demand. Manpower forecasts are developed by occupation, labor market area and time frame, while training forecasts are developed for entry, update and upgrade training needs.

The planning program is intergovernmental and interagency in nature with the States having an important role. In 1969, EPA took the initiative in developing the planning tools and providing technical assistance and training to States and their subdivisions. Manpower planning positions are now being established in EPA regions and have already been established in at least ten State and local water pollution control agencies. Moreover, arrangements are being made with the Employer Services Division of the Department of Labor to provide testing and recruiting services to local agencies.

Additional Manpower Required
By 1976

Personnel Category	Nongovernmental	Sector Local	State	Federal (Non-EPA)	EPA	Total
Professional	10,200	1,300	3,400	1,300	600	16,800
Operator	33,300	8,900	– –	1,400	– –	43,600
Technician	18,400	1,200	400	200	200	20,400
Other	10,400	11,700	800	400	600	23,900
Total	72,300	22,100	4,000	3,300	1,400	104,700

Labor Force Growth
1971-1976

Personnel Category	Manpower Engaged (1971)	Manpower Requirements (1976)	Percentage Increase
Professional	25,400	42,200	66
Operator	49,300	92,900	88
Technician	26,900	47,300	77
Other	47,800	71,800	50
Total	149,400	254,200	70

Forecasted Training Requirements
(Average Annual Load – 1972 - 1976)

Sector Personnel Category	Nongovernmental		Local		State		Federal Non-EPA		EPA		Total	
	Entry	Update	Entry	Update	Entry	Update	Entry	Update	Entry	Update	Entry	Update
Professional	2,960	9,140	500	2,480	880	1,920	520	2,640	160	1,260	5,020	17,440
Operator	8,260	16,020	3,480	17,080	– –	– –	520	2,460	– –	– –	12,260	35,560
Technician	5,160	14,860	480	2,300	100	260	140	960	40	280	5,920	18,660
Other	2,580	3,280	400	1,260	– –	– –	60	280	180	– –	3,220	4,820
Total	18,960	43,300	4,860	23,180	980	2,180	1,240	6,340	380	1,540	26,520	76,480

Gross manpower and training requirements can be partially fulfilled through activities designed to improve effectiveness and efficiency of the existing labor force, as well as through activities designed to train additional members of that force. Accordingly, EPA has undertaken a number of activities in this area.

EPA has produced and now distributes a *16mm color-sound movie,* in both English and Spanish, entitled "Talent Search," depicting the work, training, and importance of wastewater treatment plant operators. The purposes of "Talent Search" are: to encourage people, particularly youth, to enter the wastewater treatment field; to dispel erroneous ideas about the work of the wastewater plant operators; to enhance the self-image of the operators, thus helping them to take pride in and appreciate the importance of their jobs. This movie, which won a top award from the National Visual Communications Association, has been shown to numerous groups of high school students, unemployed workers, placement groups, and environmental organizations.

EPA has developed and now distributes recruitment brochures, in both English and Spanish, that summarize the challenges, tasks, opportunities, and rewards offered by employment in the wastewater treatment field. To date, over 200,000 pamphlets have been distributed.

From time to time, EPA staff members prepare *articles for publication* in general circulation periodicals related to the need for wastewater treatment manpower. EPA also obtains and distributes *reprints* of articles suitable for manpower recruitment.

Recognizing that *recent veterans* are very important recruitment source, EPA has established a mail-order recruitment and referral system for new veterans as well as servicemen pending discharge.

Once satisfactory personnel have been recruited, the next concern is the retention of these newcomers, so that the recruitment and training investment will not be wasted. To date, the primary EPA focus on retention has been on operators. Retention rates for operators have been low, particularly in the first year of employment. The basic prerequisites for high retention of productive employees include: good working conditions; favorable job image; good pay; opportunity for advancement.

The operators' working conditions are not the most pleasant and the operator's job is generally not held in high esteem by his community. In a recent study of operator trainees conducted for EPA, only 4% expressed complete satisfaction with public appreciation of their work. Fifty-two percent were generally not satisfied, and 19% were completely unsatisfied.

While no hard data are available, pay rates for operators are generally acknowledged to range from very low to very high, but on the average to be at most not more than barely adequate. Further, while there have been opportunities for career advancement of operators, they have not been adequate.

One possible way to positively affect all of these retention factors and also improve manpower utilization is through Operator Certification. Interest in certification of operators has been growing among the states in the hope that ensuring minimum personnel qualifications will improve the operational effectiveness of wastewater facilities. The President supported this trend in his February 10, 1970, Message to Congress, and later by his Executive Order 11507, which requires operators of Federal waste treatment plants to be certified by the State in which the plant is located.

The Water Pollution Control Federation and the American Water Works Association have recently addressed themselves to the problems of certification and have made significant contributions toward their solution. EPA views these efforts with favor. Yet, if State certification is to be meaningful, practices must be standardized and training opportunities proliferated, for more stringent certification requirements will greatly inflate the size and complexity of the operator training problem. Such an effort on a nationwide effort will require the resources of the Environmental Protection Agency.

EPA believes strongly that states should establish mandatory uniform certification laws based on national criteria. To meet this objective EPA is providing technical and financial support to the Water Pollution Control Federation, the American Water Works Association and other interested organizations to establish a National Certification Board. This board will serve as an information center for certification activities, recommend standards and guidelines, facilitate reciprocity between State programs and assist authorities to establish and update programs. There will be difficulty in establishing uniform criteria for certification because of the variations in present practices. Further, at present there is not a sufficient understanding of the operational tasks performed in the industry as a whole.

More productive use of available manpower will also lead to a reduction in gross manpower requirements and hence, in training requirements. The employer is basically responsible for optimum manpower utilization. However, because of the Federal investment in new facilities, EPA has taken direct actions to ensure proper operation and maintenance.

In response to a recommendation of the Comptroller General, EPA has issued a document, *"Federal Guidelines: Design, Operation, and Maintenance of Wastewater Treatment Facilities."* The guidelines require applicants for facility construction grants to include in their applications a list of the numbers and types of personnel needed to operate and maintain the proposed plant. This list must be updated at the completion of 50% of the construction. Thirty days prior to plant start-up, another update must be reported to the cognizant State Agency. Further, the chief operator must be employed by the time construction is 50% completed in order to ensure his full familiarity with the plant. Finally, the designer is required to consider manpower utilization factors and to furnish an operations manual to the owner. EPA has also let a contract to provide designers with basic data and concepts for use in development of operation and maintenance.

Task analysis studies are currently underway at two State Universities concerning the operations and maintenance activities associated with wastewater treatment plants and collection systems. These studies will contribute to optimum utilization of personnel.

Moreover, EPA has funded four pilot programs for decision-makers, as well as a national decision-makers workshop, also a project with the National League of Cities to assist in the placement of trainees. To accomplish these objectives, EPA must coordinate closely with others, particularly with other Federal agencies whose support, resources, and programs share compatible objectives.

EPA has taken the initiative in the development of a multi-faceted training program to supplement the roles played by others, to help overcome the limitations of their activities, and to attempt to satisfy the unmet training needs of the professionals, technicians and operators in or entering the field of water pollution control. Table summarizes the training programs conducted by EPA.

1. *Professional Training Grants.* EPA awards professional training grants to institutions for the establishment, expansion, and improvement of graduate-level programs in water pollution control. This program is intended to produce a cadre of trained professionals prepared to contribute directly to water quality management through operations, management and design of treatment facilities and through subsequent positions in teaching, research and consulting in both the public and private sectors. During the academic year 1971-72, a total of $4,562,682 was awarded by EPA for these Professional Training Grants.

2. *Research Fellowships.* EPA also awards fellowships to graduate students for selected specialized research training. The purpose of this program is to increase the number and competence of engineers and scientists qualified to conduct independent research and advanced practice in conjunction with teaching at the graduate level. During the academic year 1971-72, a total of $315,000 was awarded by EPA for Research Fellowships. This program is currently being revised and at present no new applications are being reviewed. However, with new legislation, plans call for this program to have an even greater impact than in the past.

3. *Direct Technical Training.* EPA conducts a program of direct technical training and provides technical assistance to others similarly engaged. The purpose of this program is:

- To provide a continuing, comprehensive program of specialized and advanced technical training generally unavailable elsewhere.
- To research and develop instructional technology, and to provide an instructor development program.
- To provide instructors and/or training materials in support of the training programs of other Federal, State and local agencies.

Students are drawn from the staffs of many water pollution control employers, usually for short courses–two weeks or less–conducted in EPA facilities by specialists from the EPA staff. Normally, courses are oriented to professionals, although they are also available to other personnel categories.

The following table summarizes recent program experience:

SUMMARY OF EPA TRAINING PROGRAMS

Program	EPA Authority	EPA Contribution
Professional Training Grants	Subsection 5(g)(3)(A) of the Federal Water Pollution Control Act	Financial support to educational institutions for graduate-level programs in water pollution control.
Research Fellowships	Subsection 5(g)(3)(B) of the Federal Water Pollution Control Act	Awards to graduate students for specialized research training in water pollution control.
Direct Technical Training	Subsection 5(g)(3)(C) of the Federal Water Pollution Control Act	Direct training and support for others in technical matters relating to the causes, prevention, and control of water pollution.
MDTA		
Coupled OJT Institutional Training	Agent for the Departments of Labor (DOL) and Health, Education, and Welfare (DHEW) under the Manpower Development and Training Act (MDTA)	Program administration for entry-level operator training.
Public Service Careers	Agent for DOL under MDTA	Program administration for entry-level operator training.
Transition	Agent for DHEW and the Department of Defense	Program administration for entry-level operator training.
Pilot Program	Subsection 5(g)(1) of the Federal Water Pollution Control Act	Direct training, financial support, and training support for update and upgrade operator training.
Undergraduate Training Grants	Section 16 of the Federal Water Pollution Control Act	Financial support to undergraduate institutions to conduct programs in water pollution control; facilities design and facilities operation and maintenance.
Undergraduate Scholarships	Section 15 of the Federal Water Pollution Control Act	Awards to undergraduate students for study leading to careers in the operation and maintenance of wastewater treatment facilities.

YEAR	COURSES	STUDENTS
1969	45	1,297
1970	57	1,560
1971	59	1,630

These students came from at least 14 different occupational groups.

4. *Operator and Technician Training.* EPA has also been active in training for jobs below the professional level. This has been done, first, as a program manager for the Departments of Labor, Health, Education and Welfare, and Defense, with training activities conducted pursuant to the Manpower Development and Training Act (MDTA); secondly, under Subsection 5(g) (1) and Section 16 of the Water Quality Improvement Act.

As program manager under MDTA, EPA has operated four types of entry-level and/or upgrade operator training programs. Training is conducted through subcontracts from EPA to units of State governments, municipalities, special wastewater treatment districts, vocational schools, community colleges, and universities. Additionally, EPA works with State and local agencies to help them qualify for MDTA support, arranges training for instructors, provides teaching materials and curriculum development assistance, and assists State and local governments in getting projects underway.

a. *Coupled On-the-Job Training.* This program offers entry-level and upgrade operator training for the unemployed and underemployed in wastewater treatment plants through combined classroom and on-the-job training tailored to meet operational realities. Unlike traditional DOL programs, which provide training in a single facility, our national Coupled OJT Program uses a twofold approach to training. Twenty-five percent of the subcontracts were awarded directly to large municipal wastewater treatment plants for the provision of centralized training; the balance were awarded to cities, community colleges, or councils of government to serve a number of small and medium-sized plants within the surrounding communities with decentralized training.

Under the decentralized approach, classroom instruction is given in one plant–during or between hours, depending on the plant schedule. Over-the-shoulder OJT is provided by the classroom instructor (who must have operational knowledge) in the plant where the trainee is employed. To eliminate gaps in coverage, correspondence courses and audiotapes are available for self-study at home. The length of the first training course was 44 weeks and consisted of 330 hours of classroom instruction and at least 70 hours of over-the-shoulder OJT for each trainee. Classroom instruction was normally devoted to basic courses in various subjects, such as mathematics, biology, and chemistry.

The initial program at 29 training locations, with a total budget of $1,031,755, demonstrated that the EPA-MDTA mechanism worked. Out of 1,055 trainees, 936 successfully completed the course. As a result of the program, the average trainee's salary increased from $7,600 to $8,600. The average salary increase was 13.2 percent, with the maximum individual trainee increase being 35.2 percent. Ninety-seven percent of all trainees in the program received some type of salary increase. Ninety-three percent passed certification tests. The training was well received and highly praised by State and local officials and by plant operators, who indicated that motivation on the job was noticably increased among operators who had participated in the training.

Based on the success of the initial program, the second national coupled OJT contract (November 1970 - October 1972) was awarded to train 1,000 persons at a cost of $1,260,000 in 40 training locations throughout the country.

The program under this contract represents a refinement of the initial training course in two major ways:

- To increase the labor pool of wastewater treatment plant personnel, 30% of the enrollees are new entrants (rather than the 10% originally required), and at least 40% are Vietnam Veterans.
- To be responsive to local conditions and needs, training time is optional. Duration of training varies from 24 weeks (two courses with 10 trainees each) to 48 weeks (one course with 20 trainees), but all trainees receive essentially the same number of hours of classroom instruction and OJT.

The third national coupled OJT contract (March 1972 to April 1973) was awarded to train 870 persons at a cost of $999,978. This training program is operating concurrently with the second national contract, and allows for much more flexibility in types of training and length of course, such as water as well as wastewater training.

b. *Institutional Training.* EPA administers a national institutional training program with funds being provided by interagency agreement with DOL and HEW. Institutional training provides basic education and occupational training for unemployed and underemployed. A distinctive feature of the EPA program is that the course includes practical "hands-on" training in a local wastewater treatment plant.

The first institutional training program (October 1970 to June 1973) was awarded to train 360 persons. The program is conducted by nine community colleges or vocational training schools. Funding was $743,690, with EPA contributing $50,000. Stipends and subsistence allowances for trainees amount to $500,000, making a total contract of $1,293,690. Trainees are recruited from areas of need, with emphasis on Vietnam veterans. Trainees receive 440 hours of classroom instruction and 440 hours of hands-on training in a treatment plant. State Employment Services are urged to recruite Vietnam veterans whenever possible.

A second institutional training contract continues and expands current efforts. This contract, running concurrently with the first, began January 12, 1972 and expires

December 30, 1972. The program is designed to train 260 persons at a cost of $551,234, plus an additional $850,000 for stipend and subsistence allowances. Training is being conducted at eight community colleges or vocational schools. Since the program has met with success, it is expected that the program will be continued beyond the expiration date.

c. *Public Service Careers (PSC).* With the initiation of the Public Service Careers Program, and specifically its Plan "B", which is tailored to channel funds from Federal to State and local agencies, EPA negotiated an interagency agreement with DOL to train 922 persons (465 new hires and 463 upgrade-employees).

Four states – Texas, Virginia, South Carolina, Wisconsin – and the Virgin Islands were awarded contracts to participate in the EPA program, which began in November 1970 and cost $1,700,000. In addition to providing training and supportive services, program sponsors are responsible for finding job vacancies within their jurisdictional limits and for cooperating with regional, county and municipal governments in filling these positions.

EPA's PSC Program has been extremely successful. As of August 31, 1971, a total of 876 trainees had been enrolled. Although contract commitments call for a total of 922 trainees, it appears this will be exceeded by 40 percent upon contract termination date.

d. *Military Transition Training.* Recognizing the potential manpower for water pollution control represented by returning servicemen who already have basic skills, EPA negotiated an interagency agreement with the Departments of HEW and Defense to establish a program of transition training in entry-level operator positions. The purpose of the Transition Training Program is to provide veterans with marketable skills for employment in wastewater treatment plants through retraining before discharge from the service.

Nearly 500 servicemen are being trained under the first contract (October 1970-September 1972). Basic education and OJT are provided by ten joint facilities (military institutions with or near wastewater treatment plants and nearby academic institutions). Duration of the course is determined by each service. Total cost of the program – including the cost of instructors, supplies, equipment, program administration and supervision, and job placement assistance – is $498,374.

The second Transition program, (January – December 1972), costing $303,909, will train 290 persons. The distinguishing feature of this contract is that the course has been lengthened from 240 hours to 480 hours. This 12-week program is being conducted at eight military installations. This contract also provides training at overseas military installations.

In addition to managing an interagency agreement for Transition Training, EPA coordinates efforts to place successful trainees in plants upon their separation from military service. (About 70% of the servicemen who have already completed the Transition Training Program have gone directly into operator trainee jobs in plants or into advanced training programs.)

The four above mentioned MDTA programs, that have been conducted through Interagency Agreements between EPA, the Department of Labor, HEW, and the Department of Defense, have been considered highly successful. They have provided funds to EPA to update the skills of over 6,000 currently employed operators and have provided entry-level training to over 2,000 new-hires since Fiscal Year 1969. It is expected that the MDTA funded programs will be a continuing source for training manpower.

5. *EPA-Funded Programs.* To provide a more comprehensive approach to training in wastewater treatment plant operation, subsection 5(g) (1) of the Water Quality Improvement Act authorized EPA to develop a Pilot Program intended to supplement – not supplant – other manpower training programs, such as those funded under MDTA.

Using funds from the FY 1971 supplemental appropriation and FY 1972 no-year funds, EPA initiated three programs:

Program	*Total Number Of Trainees*	*Total Amount Of Grant*
Advanced Instructor Training	200	$ 84,000
Specialized Training in Advanced Wastewater Treatment	1,675	505,000
Grants for Special State Projects	7,925	1,684,000
TOTAL	9,800	$2,273,000

a. *Advanced Instructor Training.* Instructors of the basic operator training courses also require upgrade training in advanced teaching techniques. A grant was awarded to Drake University to develop and conduct training, which began in June 1971. Participation in the course provides the advantage of contact with professional educators, more sophisticated education skills, and the opportunity for both college credit and upgrading of instructor credentials.

b. *Specialized Training in Advanced Wastewater Treatment.* When the Pilot Program was authorized, few programs on advanced wastewater treatment operations were offered at the State and local levels. EPA awarded two grants for development of advanced experimental and demonstration projects: to the Tennessee Department of Public Health; and the Texas Engineering Experimental Station. The total cost of the two advanced wastewater treatment programs, including trainee subsistence and travel, will be approximately $183,000.

c. *Grants for Special State Projects.* Seventy-three grants were awarded to 39 states, Puerto Rico and the Trust Territory for development of operator or operation-related training and information programs. These projects include: management training for the first-line supervisors; phosphorus removal training programs; electrical and instrumentation courses for plant personnel; information and orientation seminars for local officials and policy decision-makers; correspondence study programs and mobile laboratories to reach plant personnel in rural areas. For this latter purpose, EPA has developed, through a grant with Sacramento State College, a correspondence field study program and is making it available (at no cost) to 4,100 enrollees. Mobile labs are operating in New England, Oregon and Arkansas. Each state conducts its own training program or contracts for its performance. EPA provides technical assistance, particularly for developing curricula and training materials.

6. *Undergraduate Training Grants and Undergraduate Scholarships.* The last of the EPA training programs provides grants and scholarships at the undergraduate level for training of higher-level operators, technicians, and pre-baccalaureate engineers. The entire FY 1971 appropriation of $331,000 was used to award grants to seven institutions for planning and design of curriculum material, for initiating training programs, and for materials development.

As the role and strategy of EPA at the national level require strengthening, so do the roles and strategies of the State water pollution control agencies. Much of EPA's training strategy depends on the assumption of greater, and, indeed, parallel responsibilities at the State level. The capacities of State agencies to do so are limited and require immediate attention. They must be strengthened to assume greater leadership, and coordinative roles and programs must be tailored to the institutional arrangements peculiar to individual States.

A massive, concerted effort on the part of Federal, State and local governments, of professionals such as yourselves, and of private citizens in all walks of life will result in the achievement of our common goal – Clean Water for the Nation.

DRINKING WATER SUPPLIES

In the last 100 years, the achievements in the water supply field have been remarkable. One can now travel anywhere in the United States and drink water from public supplies with little fear of getting sick. However, the quality, safety, and adequacy of the municipal water supply systems in America today are not above reproach. Furthermore, studies have shown that large segments of the population served by individual water supply systems are consuming unsafe water. Finally, some 20 million people do not have running water in their homes and must haul water from questionable sources. A basic problem is that while our national water resources are fixed, our need for water is continually increasing.

The foundation for an adequate supply of safe drinking water is an effective research program is essential for the promulgation of drinking water quality standards, the improvement in water storage, treatment and distribution practices, and intelligent surveillance and monitoring of drinking water supply systems. Major research activities conducted by the Division of Water Supply Programs, Office of Water Programs.

a. *Epidemiological investigations* of water-borne deseases and toxicities to find the relationship between water quality and desease.

b. Development and application of methods for *isolating and identifying viruses and bacterial pathogens* – methods of sufficient sensitivity to detest the quantities likely to be present in drinking water.

c. Development and application of methods for *recovery and identification of organics* in drinking water.

d. Studies to determine the acute and the long-range *chronic effects of organic and inorganic chemicals* that may be found in drinking water.

e. Development and evaluation of *water treatment processes.*

f. Development of simple, rapid methods for *detection and quantification of bacteria, chemicals, and toxic agents in water.*

Special studies are a key part of EPA's water supply program. Through this means, vital information is obtained which is then used to shape and direct EPA's activities in research, training, standards development and technical assistance.

1. *The Community Water Supply Study.* This study, which was completed in 1970, consisted of a detailed evaluation of 969 community water supply systems throughout the country. A broad range of system sizes, types of source waters, and complexity of treatment facilities were included. Primary findings were as follows:

a. Thirty-six percent of 2,600 individual tap water samples contained one or more bacteriological or chemical constituents exceeding the limits of the Drinking Water Standards.

b. Fifty-six percent of the systems evidenced physical deficiencies.

c. Seventy-seven percent of the plant operators were inadequately trained in water microbiology and 46 percent were deficient in chemistry relating to their plant operation.

d. Seventy-nine percent of the systems were not inspected by State or county authorities in the last full calendar year prior to the study.

Overall, the smaller systems evidenced more numerous deficiencies than the larger ones.

2. *Pilot Studies of Federally-Related Water Supplies at Recreational Areas and Rest Stops.* A study of water supplies at Federal reservoir installations constructed by the Corps of Engineers has been completed. A similar study of water supplies constructed by the Bureau of Reclamation is underway and studies of water supplies at national park camp areas and along Federal interstate highways are in the planning stages. The results of pilot studies completed show 15 percent of the water supplies exceed bacteriological quality limits and 23 percent of the supplies exceed either the bacteriological or the chemical mandatory limits.

3. *Individual Water Supply Studies* Drinking water for more than 50 million Americans is supplied from individual wells, springs, rainwater catchments or unprotected surface water sources. Traditionally, ground water coming from its natural environment has been considered of good sanitary quality -- safe to drink, if palatable. However, recent studies of these individual drinking water systems in several states have shown that a large segment of our population is drinking water that is bacteriologically unsafe and of poor chemical quality. The results

of the surveys indicate that more than a third of the water supplies sampled are potentially hazardous to the users.

4. *Special Water Quality Monitoring Studies.* Periodically, the need arises to conduct studies to determine the presence of particular contaminants, rather than to gain information about a type of water supply system. Recent examples of these studies are investigations to detect the presence of herbicides and mercury in drinking water.

Standards for potable water in this country were first issued in 1912 in response to legislation designed to prevent the interstate spread of communicable disease. Over the years they have been modified and expanded many times. The current revision appears as the 1962 U.S. Public Health Service Drinking Water Standards. When EPA was established, the standard setting authority for potable water was transferred to the new Agency.

In recognition of the need to revise and update certain portions of the Standards, an EPA-sponsored task force of technical experts was assembled to develop recommended revisions to the 1962 Standards. Their work is now completed and the EPA Administrator has assembled a public advisory committee to review the recommended revisions and report their findings to him.

Noteworthy changes proposed are:

a. The addition of a standard plate count to the bacteriological standards.

b. A provision to allow the partial substitution of chlorine residual determinations for coliform samples.

c. A reduction of allowable turbidity from 5 s.u. to 1 s.u.

d. Turbidity to be removed from the esthetic standards list to the health related standards list.

e. The addition of a sodium standard to protect those persons on a restricted sodium diet.

f. The addition of a limit for mercury.

g. The addition of pesticide concentration limits.

EPA is responsible for the maintenance of a national inventory of water supply systems serving the public. The water supply inventory was started in the Public Health Service 1939. It was published at five-year intervals until 1963. The 1963 inventory listed 19,236 supplies serving 150 million people. Most of the supplies were small, about 85 percent served 5,000 or fewer persons. About half of the people served by water supplies were served by the 399 supplies serving more than 100,000 persons. The other half were served by the 18,837 small supplies. About 75 percent of the supplies used ground water, 18 percent surface water, and seven percent mixed sources.

EPA is currently updating the inventory. Data collection was started last spring and is to be completed within a year. It is anticipated that over 30,000 water supply systems will be identified. Collection of the data will require a high degree of cooperation among EPA, State and local governments and the utility industry.

The new forms on which the data will be collected were designed with the assistance of potential users of the data -- the Conference of State Sanitary Engineers, the American Water Works Association, the National Water Well Association -- and Federal agencies involved in the field of water supply. Data from completed forms is fed into EPA's STORET computer as soon as it is received. A computer program is being developed to allow analysis and print-out of the data in a variety of forms.

Through technical assistance to State and local governmental groups and water utilities, EPA disseminates and promotes the use of the latest technological developments and practices in the water supply industry. The technical assistance takes several forms:

1. *Evaluation of State Water Supply Programs.* Where requested by a State, EPA will perform a comprehensive evaluation of its water supply program. These evaluations are being made as a result of the findings of the 1970 Community Water Supply Study of 969 water systems which revealed inadequacies in State surveillance programs. The evaluations involve a representative sample of water supply systems and include a review of State laws, rules, regulations, and policies; surveillance, monitoring training, and technical assistance activities; a study of bacteriological and chemical analytical capability; and field evaluations of selected water supply systems supported by bacteriological and chemical analysis of water quality. Evaluations have been completed or are in progress in Connecticut, Idaho, Kansas, Tennessee, New Jersey, New Mexico, Ohio, Maryland, Wyoming, and Kentucky.

2. *Publications.* EPA publications provide information on water supply systems and related areas. They are available through the Government Printing Office of the Environmental Protection Agency. A partial listing is:
Community Water Supply Study, Analysis of National Survey Findings Community Water Supply Study, Significance of National Findings Public Health Service Drinking Water Standards.
A guide to the Interstate Carrier Water Supply Certification Program Manual for Evaluating Public Drinking Water Supplies.
Individual Water Supply Systems.
Water Supply and Plumbing Cross-Connections.
Evaluation of Water Laboratories.
Health Guidelines for Water and Related Land Resources Planning, Development, and Management.
Fluoridation Engineering Manual, Final Draft.

3. *Specialized Assistance.* To the limit of staff availability, EPA personnel provide specialized technical assistance through regional offices. The regional staff received back-up support from EPA Headquarters and laboratory personnel.

As the needs increase for complex treatment and monitoring of drinking water supplies, the requirements grow for trained personnel. EPA offers three types of training for water supply personnel:

a. Specialized short courses presented at EPA's National Training Center in Cincinnati, Ohio.

b. Specialized courses presented at field locations.

c. Short course for water treatment plant operators.

Under the authority of the Interstate Quarantine Regulations, EPA is responsible for the certification of water supply systems serving trains, planes, busses, and vessels crossing state lines or using international ports or terminals. Classifications are based on information and recommendations provided by the states. This is supplemented by Federal or joint State-Federal surveys of the water supply systems. Supplies that are found to be in substantial compliance with the Federal Drinking Water Standards are classified as approved. Where serious deficiencies exist in the actual water quality, the surveillance provided, or the physical facilities and their operation, the supply is prohibited for use by interstate carriers. A provisionally approved classification is given if there are significant deficiencies, but an imminent and substantial danger to health does not exist. Some 648 water supply systems serve interstate carriers as well as a resident population of 80 million people; 129 of these are provisionally approved. Between August 1970 and March 1972, 15 supplies were prohibited for use by interstate carriers.

The demand for water is increasing through population growth and advancing technology, while the supply of water from nature remains basically constant from year to year. Therefore, EPA:

a. Supports and encourages the development and practices of successive wastewater reclamation, reuse, recycling and recharge as a major element in water qualtiy management, providing the reclamation systems are designed and operated so as to avoid health hazards to the people or damage to the environment.

b. Recognized and supports the potential for wastewater reuse in agriculture, industrial, municipal, recreational, and groundwater recharge applications.

c. Does not support the direct interconnection of wastewater reclamation plants with municipal water treatment plants.

d. Will continue to support reuse research and demonstration projects.

The Nation's rivers and lakes have been used for both municipal water supply and waste disposal for years in many areas of the country. It is estimated that 50 percent of the Nation's population now derives its water supply from surface sources which have also received a variety of industrial wastes, untreated sewage, urban runoff and effluent from a variety of sewage treatment plants. Public health officials have relied upon time of travel or storage and treatment to protect the public against infectious diseases and toxic substances. Water quality standards and treatment requirements applicable to surface sources used for water supply permit the discharge of relatively high quantities of wastes. Indirect reuse of processed wastewater for municipal public water supply is a fact of life. Direct reuse, however, is a new matter requiring careful research and investigation before introduction.

Health problems in a direct interconnection or in a recycling situation relate to viruses, bacterial build-up, chemical build-up, the possibility of accidental spills or sabotage and a questionable record of reliability in the operation of wastewater treatment plants. Viruses are difficult to identify and measure and are more resistant to disinfection than bacteria. Carbon columns and other possible advanced waste treatment elements may harbor bacteria and contribute to the development of unhealthful levels of bacteria in a recycling situation.

The direct introduction of chemicals from a wastestream and their build-up through potable system-waste system recycling can present increased long-term chronic hazards, presently undefined. Accidental spills or sabotage present an acute threat which cannot be disregarded, as anyone can throw anything down the drain. Some system of holding and dilution reservoirs may need to be provided between the reclamation plant and the potable water intake together with the biological and chemical monitoring. With regard to the reliability of reclamation plant operation, research in California has shown that 60 percent of wastewater treatment plants studied had some breakdown during the year. Observations of engineers and others confirm that reliability is a common problem in wastewater treatment plants. Safeguards must be provided to prevent the introduction of non-treated or poorly treated wastes into a potable water system.

Therefore, EPA does not support the *direct* interconnection of wastewater reclamation plants with municipal water treatment plants.

WATER QUALITY PROTECTION

The Applied Technology Division, Office of Water Programs, develops criteria and other measures to protect the quality of surface, ground, estuarine and costal waters. This involves developing and implementing programs to identify practicable applications of existing technology for the solution of water quality problems.

The coastal zone monitoring and management program is an important example of this effort. Coastal waters supply a vast majority of the fishery resources harvested by the commercial fishing industry. They are valuable from the standpoint of mineral deposits that are extracted from the lands beneath. The coastal counties and cities adjacent to the oceans, estuaries and the Great Lakes comprise about 15 percent of the land area of the United States within which is concentrated about 33 percent of the nation's population and 40 percent of its industrial manufacturing plants. Land drainage from this area, as well as from the entire United States, becomes concentrated in rivers that ultimately deposit settleable materials and other pollutants into estuaries and coastal waters. The estuaries become the dumps for the continent.

To define pollution problems more clearly, EPA has initiated an inventory of beaches closed because of pollution, as well as an inventory of shellfish areas closed because of pollution. The initial reports on these inventories will be finished soon and periodic updating of data is planned to ensure that an assessment of the effects of pollution on both beaches and the harvesting of shellfish can be made instantaneously.

The redepositing of dredge spoil into open water areas affects both the inland and oceanic waters. Dredge spoil and other materials are currently dumped in large quantities into the ocean in specified disposal sites. There is an urgent need to regulate both types of activities to protect receiving water quality. The first step for such regulation is the development of criteria that will define the quality of acceptability for such dumping practices. The Applied Technology Division is engaged in the development of these criteria.

Tentative guidelines to define a polluted dredge spoil, which would not be suitable for redeposition into open water areas, were transmitted to EPA regional offices for their guidance in early 1971. Presently, EPA is engaged in an effort to re-evaluate the dredge spoil characteristics that were selected for this definition along with the quantitative restrictions that were used to define a polluted spoil. It is anticipated that this evaluation will be completed in 1972 and that we will reaffirm, or propose new, specific dredge spoil constituents and quantitative values for these constituents that would preclude the deposition of a particular polluted spoil into open water areas.

Similarly, criteria are being determined for the dumping of materials into the open ocean environment. The schedule for this development is currently affiliated very closely with proposed legislation in the Congress that addresses the subject of ocean dumping and its control.

PLANNING ACTIVITIES

State and local governments are required to develop water quality management plans which will maximize the cost effectiveness of investments in pollution abatement and prevention actions and lead to the maintenance and enhancement of national water quality objectives. These plans will then provide for the continuous, systematic and coordinated development of an efficient and effective course of action to protect or enhance the quality of the waters in a basin, metropolitan, or regional area.

Regulations requiring the development of these water quality management plans state that only those proposed treatment facilities which are included in a basin, metropolitan or regional plan will be eligible for Federal funding. The purpose of the regulations is to ensure that:

a. The massive public investment for waste treatment facilities is cost effective.

b. The investment will be supplemented by actions to abate other sources of pollution.

c. The investment will provide maximum protection enhancement of water quality.

The States and their political subdivisions have primary responsibility for water pollution control and are assigned the basic responsibility for this expanded planning effort. The Federal role is primarily one of assistance, guidance and evaluation. Through the Federal Water Pollution Control Act, EPA provides grant assistance to non-Federal planning agencies to support the development of *effective river* basin, metropolitan or regional water quality management plans. EPA also provides State and local governments with technical advice and guidance during the preparation of water quality management plans through guidelines and staff consultations.

In developing a water quality management strategy, the State and local planning agencies are required to consider all feasible alternatives such as treatment of wastewater, relocation of discharge points, diversion from basin, etc., before selecting a final plan. The plan that is selected must be environmentally and socially acceptable as well as cost effective.

EPA has a very active role in Federal/State water and related land resources planning. A comprehensive approach toward this planning was fostered with the passage of the 1965 Water Resources Planning Act which sets forth a policy to encourage the conservation, development and utilization of water and related land resources of the United States on a comprehensive and coordinated basis by all levels of government and non-government entities and individuals. The Act established the Water Resources Council to coordinate such planning and provided for the establishment of River Basin Commissions by the President to develop comprehensive river basin plans.

The broad objectives of this *interagency planning* are to provide a guide for Federal, State and local interests to conserve, develop and utilize their water and related land resources in an efficient and timely manner. EPA's effort in this interagency planning is directed toward assuring adequate future water supplies, enhanced water quality and full consideration of environmental quality as an important planning objective. Following are the types of plans in which EPA participates:

a. *Level A Studies.* Regional frameworks or assessments representing the broadest level of plannings.

b. *Level B.Studies.* Reconnaissance scope investigation for selected areas which attempt to resolve complex problems identified by the Level A studies.

c. *Level C or Implementation Studies.* Program or project feasibility studies generally undertaken by a single Federal, State, or local entity to obtain project authorization by Congress or to provide other bases for implementing a single plan.

At present, EPA is taking part in nine Level A studies and eleven Level B studies.

EPA interagency activities also include participation in the studies conducted under the National Wild and Scenic Rivers Programs. This program commenced in 1968 with the passage of the Wild and Scenic Rivers Act. In accordance with this Act, Congress designated all or portions of eight rivers as original components of the National Wild and Scenic Rivers System. Since 1968, twenty-seven other rivers or sections of rivers have been designated for study. Since water quality is a major criteria in determining whether a given river should be recommended for inclusion as a national wild, scenic or recreational river, EPA's participation in the studies is critical.

State and local planning agencies have multiple interrelated options leading to developing basin plans for water quality management. Mathematical models of many kinds are available as useful tools in the planning process by simulation of water quality. The Federal function in this context is guidance, assistance, and evaluation achieved in this way:

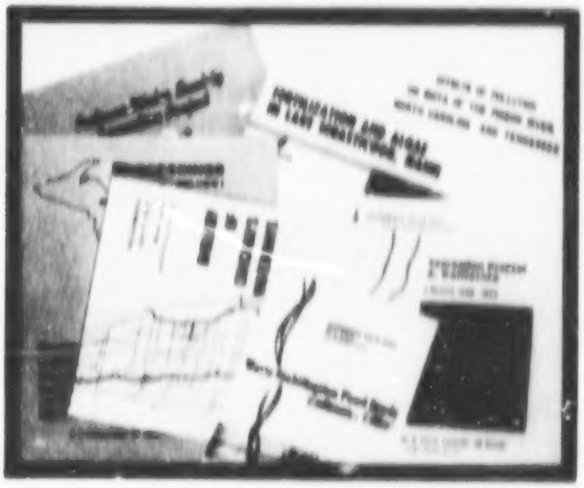
a. Stimulate the use of mathematical models by State and local planning agencies.

b. Provide models designed to simulate and predict water quality in specific river basins under a variety of alternative conditions.

c. Assist State and local agencies in technicalities of model use.

d. Evaluate and review water quality simulation and prediction aspects of basin plans.

By resorting to models as planning tools, agencies can effectively cope with complex basinwide wasteload allocation problems.



TECHNICAL STUDIES AND ASSISTANCE

The Federal Water Pollution Control Act provides that investigations and surveys may be conducted concerning any specific problem of water pollution confronting any State, interstate agency, community, municipality, or industrial plant for the purpose of recommending a solution to such problems. Requests for studies are generally forwarded by the State water pollution control agencies.

In some cases a short-term consultation by an engineer or scientist knowledgeable about the problem may be sufficient to arrive at a solution. In other cases an interdisciplinary field study may be required which could last from two weeks to several years, depending upon the nature and extent of the problem. Such studies are addressed to a wide assortment of problems that may range from the effects on water quality of the effluent from a particular industry, to the efficiency assessment of a complex industrial wastewater treatment operation or a nutrient balance and recommendations for the control of eutrophication in a lake or reservoir.

Many of these studies call for an interdisciplinary approach. The engineering assessment must be intertwined with the assessment of biologists, chemists, hydrologists, microbiologists, and others. Such studies are expensive in manpower and money because sufficient data must be collected through repetitive sampling at sampling stations to support valid conclusions and recommendations. In many instances it is necessary to collect samples for specific water quality characteristics from predetermined stations daily for a period of two or three weeks to obtain reliable data. When a seasonal influence is anticipated, this sampling procedure must be repeated seasonally.

During the past year, about 80 such field investigations were made on critical water pollution problems that involved more than one man-month of effort each. About 60 percent of these studies were made for Federal agencies and the remainder were made for non-Federal agencies. The average study involved 2.5 man-years of effort. In addition to the field investigations, experienced scientists and engineers within the Applied Technology Division, Office of Water Programs, respond to numerous requests for advice and consultation on a wide variety of complex subjects relating to water pollution control. Many requests for such consultation involve engineering and scientific judgment relating to the effectiveness of particular water pollution control devices or water pollution management operations. The Division is involved in the investigation of significant fish kills to identify the cause of mortality, and in pollution problems connected with surface waters and ground waters. Effort is being expended to develop criteria for the control of toxic materials, and to implement measures to control eutrophication.

WATER QUALITY TECHNICAL INFORMATION

Within the Applied Technology Division of the Office of Water Programs, particular technical information is assembled and reported to form a base for development of water pollution control programs.

Late in 1971 a voluntary national industrial waste inventory was initiated by EPA. This inventory included a questionnaire that requested information on plant processes, intake water quality, wastewater characteristics, waste discharge information, waste treatment facilities costs and manpower information. The completion and return of the questionnaire by the industrial plant managers was entirely voluntary. Questionnaires were sent to 10,000 industrial plants that were selected on the basis of being representative of the major water-using industries within the United States. As of May 1, 1972, there were replies from more than 5,000 recipients of the questionnaire. Additional replies are coming daily. The information from this inventory is being placed in EPA's STORET system as rapidly as possible. It is expected that a report on the results of this inventory will be developed in late 1972.

At the present time, there are nearly 25,000 separate records of municipal waste facilities in an inventory of these facilities. These data identify the wastewater treatment facility, the community and county in which it is located, the year in which the facility was placed in operation or when it was revised, the water course to which it discharges, the population served and the population of the community in which it is located, the principal discrete wastewater treatment devices employed, the design population equivalent based on the biochemical oxygen demand, the population equivalent of the untreated or treated wastes and the pollution abatement needs to meet a level of treatment acceptability for discharge to the receiving environment.

Recently a statistical summary of these data for the municipal waste treatment facilities in the United States and an inventory of municipal waste facilities for each state were published. The inventory was prepared to conform to EPA regional boundaries; thus, there are 10 major inventory documents and one summary report. These reports are available from the Superintendent of Documents, Washington, D.C. 20402. The current inventory was based on 1968 data of municipal wastewater treatment plants. We are accelerating efforts to make the published data more current. By the end of 1972, a document that will contain June 1972 data on municipal waste facilities may be published.

An inventory is published annually on *Sewage Facilities Construction.* The latest edition details annual contract awards on sewage treatment works and collecting sewers. The basic data are arranged by States, drainage basins, population size groups, and contract size groups. This inventory details statistics on new plans with separate tables for facilities and additions, interceptors and outfalls. It also considers collecting sewer construction. The most recent publication is based on 1970 data and is available from the Office of Water Programs.

Since 1960, EPA has published an annual booklet on "Fish Kills Caused by Pollution." The most recent publication is based on 1970 data. Copies are available from the Office of Water Programs. The information for this publication is supplied voluntarily by the states, and the causes of fish killed by pollution are separated into agricultural, industrial, municipal, transportation, or other operations. In 1970, 23 million fish were reported killed by water pollution in 634 separate incidents in 45 states. Industrial operations accounted for nearly 10 million of these and municipal operations for nearly 7 million.

STORET

STORET is a computerized system that provides the capability to store, manipulate and retrieve water quality information and data. The term is adapted from the words "*sto*rage and *re*trieval". The system currently contains information on water quality derived from repetitive sampling of particular water quality stations throughout the Nation, water quality standards, pollution-caused fish kills, municipal and industrial waste discharges, waste abatement needs, cost and implementation schedules, and manpower and training. The system can provide the data necessary for decision making in regard to water quality problems and their control.

At the present time, 28 states have availed themselves of the opportunity to install computers capable of retrieving data from this national data bank. There are 133 users of the system in addition to EPA.

As of July 1972-73, 612 water quality sampling stations were identified within the STORET system. About half of these stations are presently active. There are approximately 9,000 Federal stations that were sampled at least once in 1971 and about 3,000 from which at least four samples were obtained and examined for six or more water quality constituents. About 1,000 water quality constituents are presently identified within the system. To meet EPA needs, it is estimated that the monitoring activity will average 50 samples annually that are examined for 20 or more constituents from a minimum of 5,000 stations.

With water quality data from specific stations located systematically within a drainage basin, it is possible to assess not only the general water quality of an area at a particular time but also the trend in water quality when one time is compared to another. From the latter type assessment the citizens of the United States can determine whether the water pollution battle is being won.

Data files within the STORET system contain information of municipal treatment systems, industrial plants and their wastewaters, state water quality criteria and water uses, contract awards for municipal facilities, and fish killed by pollution. Data from these separate entities are used in developing informational reports upon which a water pollution control program can be based.

EPA Regional Offices

Region	Address
I	Environmental Protection Agency John F. Kennedy Federal Bldg, Room 2304 Boston, Mass. 02203
II	Environmental Protection Agency 26 Federal Plaza New York, N.Y. 10017
III	Environmental Protection Agency 6th & Walnut Sts. Philadelphia, Penna. 19106
IV	Environmental Protection Agency Suite 300 1421 Peachtree St., N.E. Atlanta, Georgia 30309
V	Environmental Protection Agency 1 N. Wacker Drive Chicago, Ill. 60606
VI	Environmental Protection Agency 1600 Patterson Street, Suite 1100 Dallas, Texas 75201
VII	Environmental Protection Agency 1735 Baltimore Street, Room 249 Kansas City, Missouri 64108
VIII	Environmental Protection Agency 1860 Lincoln St., Suite 900 Denver, Colorado 80203
IX	Environmental Protection Agency 100 California Street San Francisco, Calif. 94111
X	Environmental Protection Agency 1200 6th Avenue Seattle, Washington 98101

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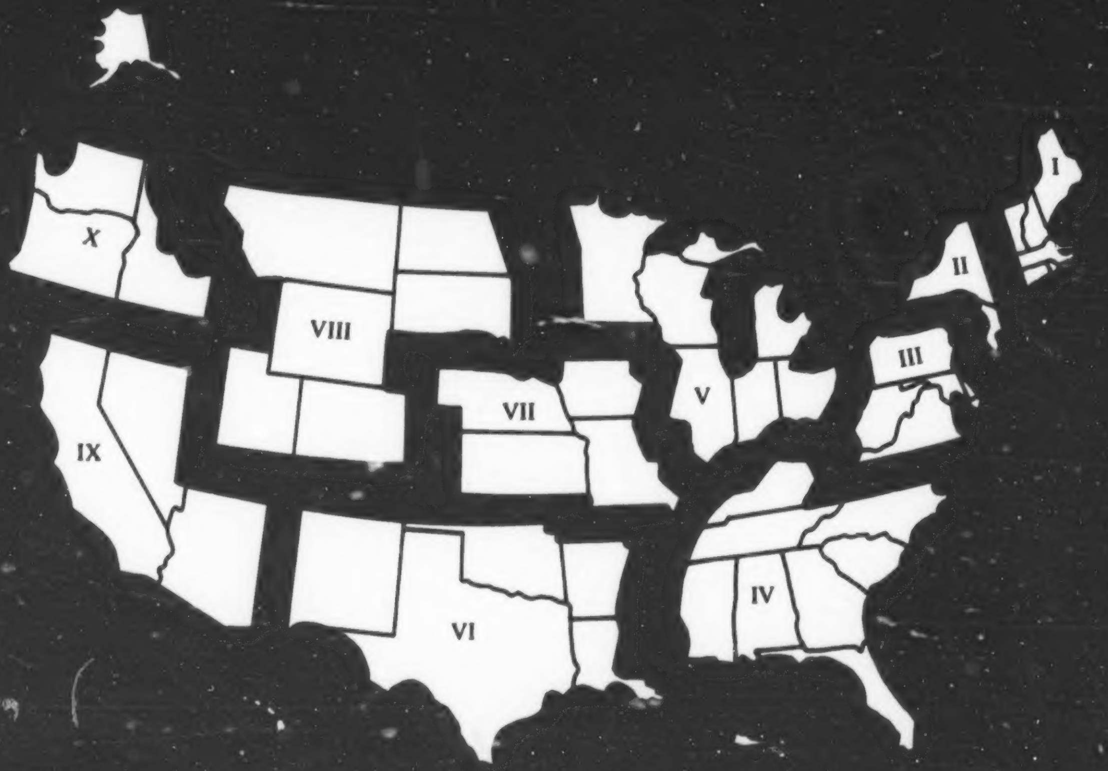
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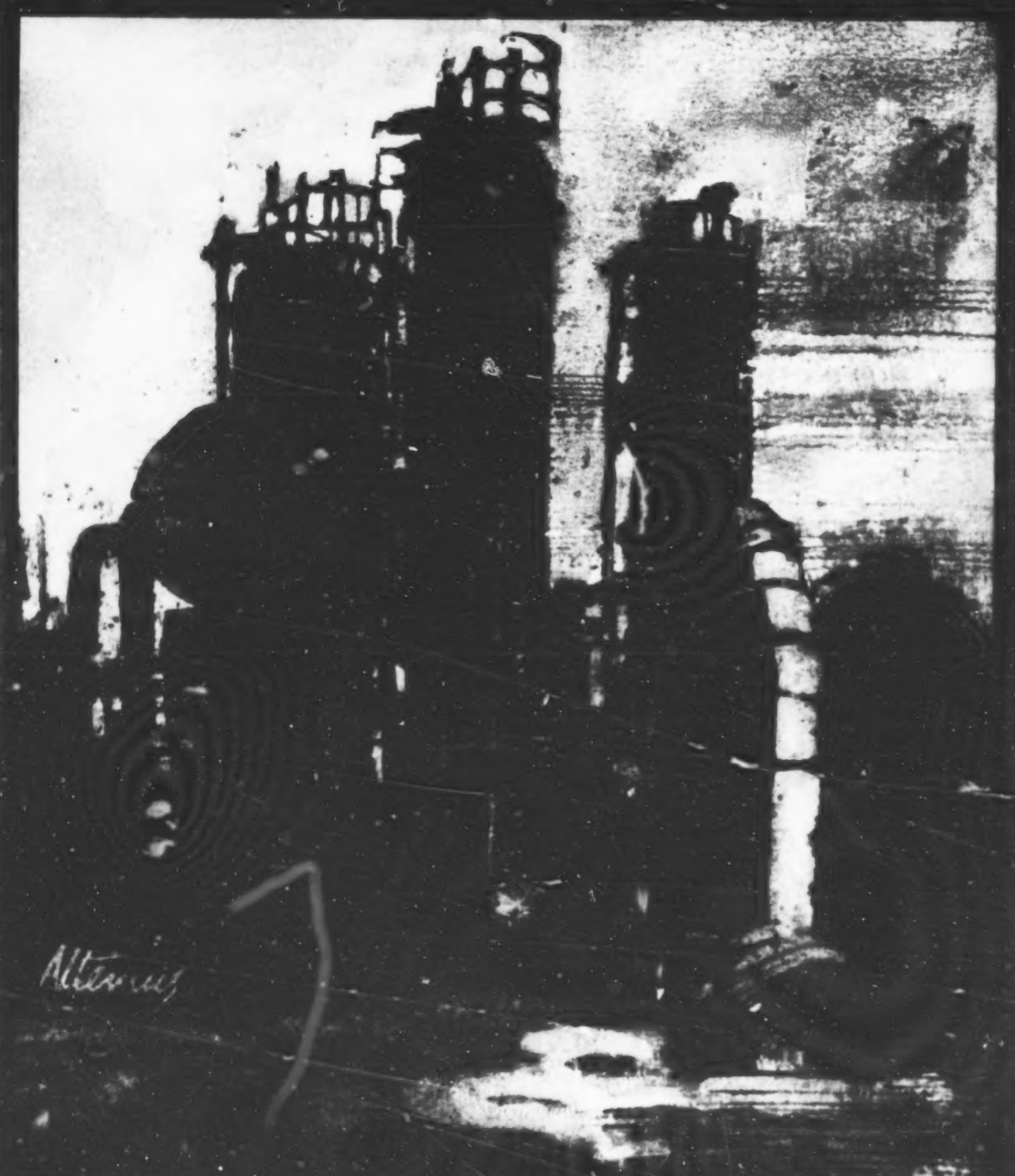

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Refuse Act Programs

The Refuse Act Permit Program is a Federal program to improve the quality of our streams, lakes, and coastal waters by applying the provisions of the 1899 River and Harbor Act ("Refuse Act") to the problems of water pollution. This statute makes it illegal to discharge materials into any navigable water or tributary without a permit from the U.S. Army Corps of Engineers. Enforcement of the Refuse Act has in the past been limited to discharges carrying suspended material which became obstructive or hazardous to navigation. Recent court decisions allowed a broader interpretation of the Act. Similarly, the Fish and Wildlife Coordination Act, the National Environmental Policy Act of 1969, and the Water Quality Improvement Act of 1970 have all stressed the urgency of a more intensive application of laws, such as the Refuse Act, which can help protect the water. In announcing the Permit Program on December 23, 1970, President Nixon stated that establishment of the program "will enhance the ability of the Federal Government to enforce water quality standards and provide a major strengthening of our effort to clean up our Nation's water."

The Permit Program covers all industrial point discharges which enter navigable waters, or their tributaries; this last phrase means that virtually all streams are included. The few discharges which are exempt from the current program are: municipal treatment systems, livestock operations under a certain size, agricultural runoff, vessels, and industries discharging to municipal treatment systems.

Briefly, the procedure for obtaining a permit is: The application form is obtained from the local Corps office and the appropriate information is filled in. To secure the required State certification, the applicant can either send a copy of this application directly to the State, with a request for certification, or he can send the application to the Corps and they will request action by the State; this is worked out individually between the local Corps and EPA offices.

The Corps will check each application to see if all the blanks are filled in and everything is in order -- if so, they will send it on to EPA -- if not, they may request further information from the applicant. EPA will do another check to see if the technical data supplied will allow a complete evaluation of effect on water quality and, if not, will ask for clarification either directly or through the Corps.

When all necessary information is in, EPA's technical staff will review the application and send the Corps recommendation on issuing or denying the permit. The Corps will incorporate their own evaluation of the discharge's effect on navigation, and the opinions of the Bureau of Sport Fisheries and Wildlife, and the National Oceanographic and Atmospheric Administration. The Corps does not issue permits if EPA recommends denial.

The State water quality agency (or interstate agency where legally designated) will certify whether or not discharges meet applicable water quality standards and/or will furnish its judgment as to the desirability of granting a permit. State agencies responsible for wildlife will be notified of permit applications and their recommendations sought. Any State agency has the opportunity to present comments, but a single overall State position is desired. The water quality agencies of adjacent States will be consulted if their waters are affected.

A permit will be denied when the State denies certification, when the applicant wishes to discharge harmful quantities of oil or hazardous/toxic materials, and when no set of conditions will adequately protect water quality or fish and wildlife. EPA will not recommend issuance of a permit if the State has denied certification. On the other hand, EPA will not automatically approve a permit even though a State has recommended favorably.

A permit will be granted only if the material which is to be discharged will be able to meet the "applicable water quality standards," which are set by State and Federal agencies. The program will prevent further degradation of our waters and insure that industrial polluters are brought into compliance with water quality standards. The program will require each industrial plant to achieve at least minimum levels of pollution control. These minimum levels will be required even though evidence may be presented to suggest that presently applicable water quality standards might be satisfied with a lesser degree of treatment or controls.

If the Corps believes a permit could be issued, they will give public notice and allow 30 days for interested parties to express their views. If they then decide that there is sufficient controversy, they will call a public hearing and consider the opinions heard there when making the final decision to issue or deny the permit. The permit will be issued in the form of an offer of terms, i.e. "permit is granted on the following conditions...". The conditions, recommended by EPA, will cover such things as:

1. Levels of waste constituents which can be allowed in the discharge.
2. Requirements for level of treatment which the permittee must reach and maintain during the period of the permit.

In some cases this will include interim dates which will allow him to improve his treatment gradually. (EPA will not specify the *method* of treatment, however the staff will be available to any permit applicant who requests advice on the treatment technology required to achieve the specified level.)

3. Monitoring, recording, and reporting requirements for the discharge. Generally speaking, EPA's technical review of the application takes place in the Regional Offices, and in most cases the decision to recommend issuance or denial is made there. Headquarters' role is mainly one of providing overall policy and general guidance, except where the Regional Office wants to override a State certification or comment, or to deviate from established policy; these cases require Washington's approval.

A primary example of Headquarters' assistance to the Regions is the set of effluent guidelines which resulted from extensive research, coordination, and consultation with waste treatment experts in the various industrial fields. Permit Program staff members have met with trade associations and industry representatives, both in Washington and across the country; and actively solicited their opinions as to what requirements could reasonably be made. These guidelines will ensure that basically similar requirements will be made of an industry wherever it is located in the country; there will be no competitive advantage to a State which has lower standards.

Water quality standards for a given reach of stream indicate the combined load of pollutants which may be allowed from all the dischargers on that reach. In the "basin approach" to setting effluent limits, the question is, "How much of the total allowable load should come from a given discharger?" The alternate approach is that of setting effluent limits for a whole industrial category. This is where EPA combines all the technical expertise that has been gathered to define the best practicable control technology currently available. All industries will be expected to achieve this level of treatment by 1976.

The setting of effluent limits, as well as many of the other computations and procedures involved in permit processing, is rapidly becoming computerized for more efficient handling. All of the most important dischargers' applications will be processed by the end of 1972. Information gathered by the Permit Program is also fed into the National Computerized Storage and Retrieval System, making it available to any interested Federal, State, or local agency. Some of the data has already been requested by such diverse groups as the National Institute of Environmental Health Services, and the U.S. Navy. The Permit Program's large contribution to this pollution control data bank is only one of the many positive side effects of the Program. Others include the discovery by industry of discharges previously unknown to them, the discovery of faulty treatment facilities, an increase in jobs, facilities, and knowledge in the waste analysis and treatment field, and even increased production at some plants, due to the recovery of raw materials through tighter waste control.

These are some of the corollary benefits which have already resulted from the Permit Program. At this writing, however, permits themselves have been held up by court injunction. EPA expects to have permits ready to issue as soon as this may be legally done, whether by the Corps after resolution of the Court's objections, or by EPA after the passage of new pollution control legislation. Current proposed legislation will give primary responsibility for the conduct of the Permit Program to EPA. Either version of the proposed legislation would cause substantial changes in the scope and procedures of the program. The National Pollutant Discharge Elimination System, as the new program would be called, would have the Corps retain authority to advise on the effect of discharges on navigation. EPA would establish criteria for eventually turning permit authority over to the States, either wholly or partially, for instance, for industrial discharges only. EPA would retain review authority of some kind; under one version of the bill it would be the power to review each permit, under the other, EPA would review the State program as a whole.

Both versions of the new water bill would cover additional dischargers, i.e., municipal treatment systems and industries which discharge to municipal systems. Also, tributaries to navigable waters would be covered, without the need to prove that the waste flows from the tributary into the navigable stream, as is now the case. The two bills have similar treatment requirements. In the Senate version, best practicable treatment is required by 1976. Best available treatment is required by 1981, and all discharges would be eliminated by 1985. The House Bill sets the same requirement for 1976, but the 1981 and 1985 goals would be revised if a study by the National Academy of Sciences should determine that they are economically unrealistic. Both bills require the development and enforcement of nationally uniform effluent limits, which complement the State standards, specifying the level of waste constituents which could be allowed to enter the stream. Under the new legislation, EPA will be empowered to take enforcement action if the State fails to. Under one procedure, we can issue a compliance order, wait 30 days for compliance and then go to court (penalties in this type of action are $25,000 for the first offense and $50,000 for the second, plus a possible jail sentence). Under a second procedure, we can go directly to court, with a maximum $10,000 fine.

Thus both the current Refuse Act Permit Program and its proposed successor, the NPDES, are conceived as one of EPA's primary tools in preventing and reducing water pollution. The ultimate goal of any such program is, of course, voluntary self-regulation, and with industry cooperation we may well reach this goal.

The program is headed by Albert C. Printz, Director, Office of Refuse Act Programs and functions under the Assistant Administrator for Enforcement and General Counsel, John R. Quarles.

EPA Regional Offices

Region	Address
I	Environmental Protection Agency John F. Kennedy Federal Bldg, Room 2304 Boston, Mass. 02203
II	Environmental Protection Agency 26 Federal Plaza New York, N.Y. 10017
III	Environmental Protection Agency 6th & Walnut Sts. Philadelphia, Penna. 19106
IV	Environmental Protection Agency Suite 300 1421 Peachtree St., N.E. Atlanta, Georgia 30309
V	Environmental Protection Agency 1 N. Wacker Drive Chicago, Ill. 60606
VI	Environmental Protection Agency 1600 Patterson Street, Suite 1100 Dallas, Texas 75201
VII	Environmental Protection Agency 1735 Baltimore Street, Room 249 Kansas City, Missouri 64108
VIII	Environmental Protection Agency 1860 Lincoln St., Suite 900 Denver, Colorado 80203
IX	Environmental Protection Agency 100 California Street San Francisco, Calif. 94111
X	Environmental Protection Agency 1200 6th Avenue Seattle, Washington 98101

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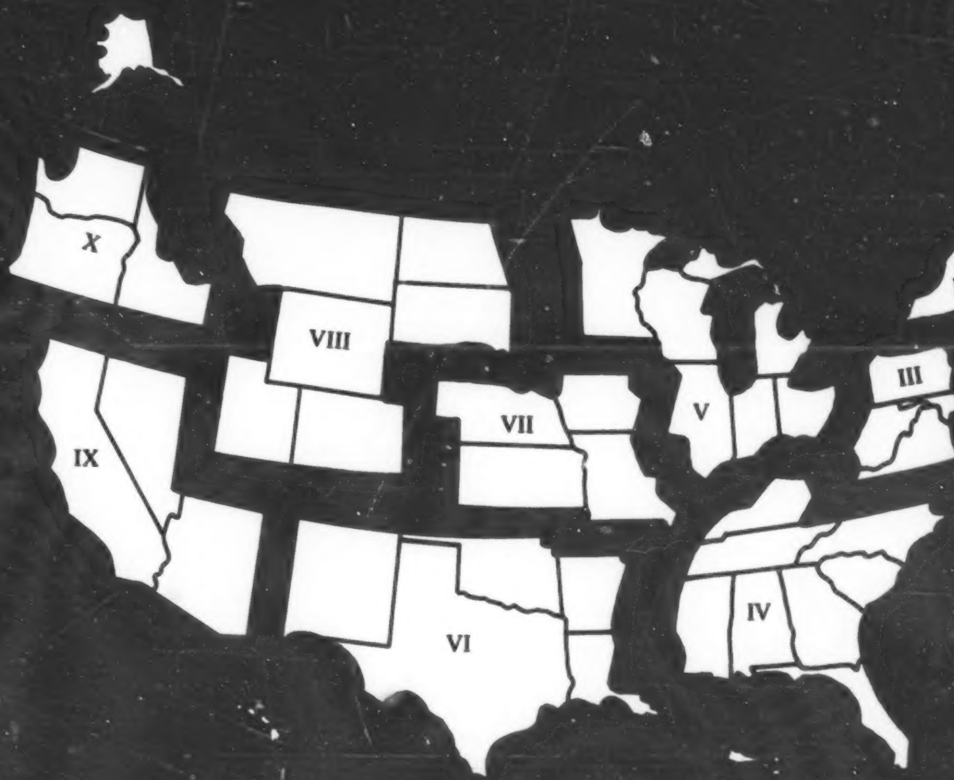
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